LAUNDRY HAUS

THIRD QUADRANT DESIGN

Mixed-Used Multi-Family || University of British Columbia

CO-CAPTAINS

Aleesha Hsu

Milan Jaan

ARCHITECTURE

Katie Theall

OUTREACH

Eric Hebbard

FACULTY SUPPORT

Dr. Adam Rysanek

CIVIL / GEO

Peter Ehrlich

Lauren Lee

BUILDING SCIENCE

Mandi Unick

Juliette Thibault

Dr. Sheryl Staub-French

ENERGY

Anika Jang

MECHANICAL

Alicia Hobmaier

STRUCTURAL

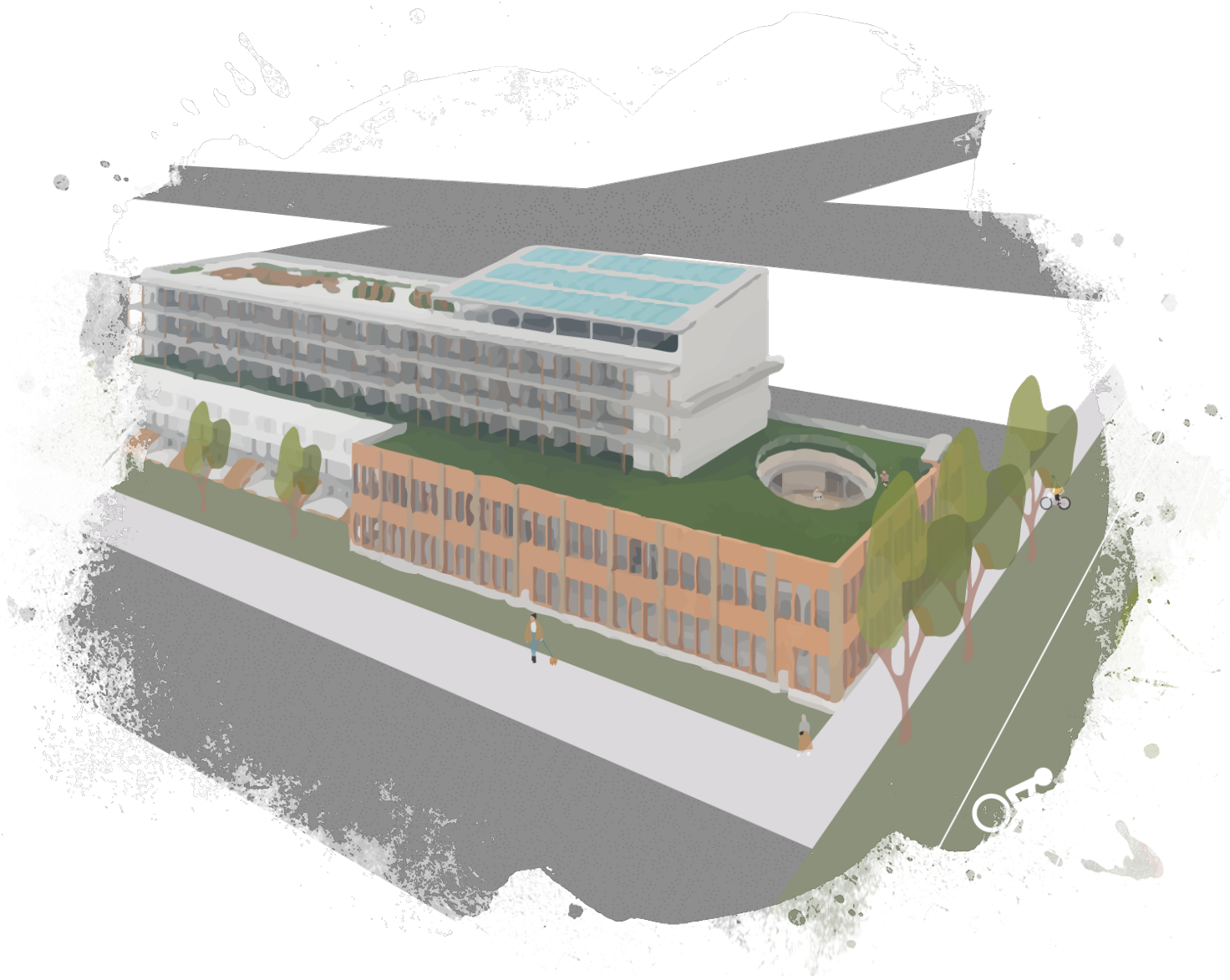
Agustina Flores Pitton

ELECTRICAL

Nestor Luis Brito

Dr. Susan Nesbit

concept



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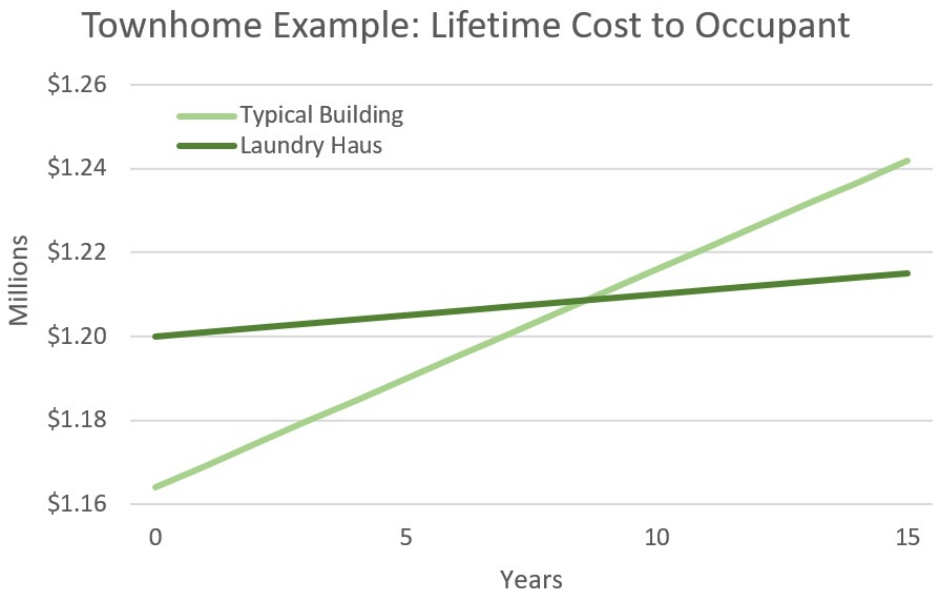
Mount Pleasant, Vancouver

Median Income	Average Household Size	Census Population	Population in Low Income Households
$66,000	**1.8**	**32,955**	**16%**



2nd least affordable market in the world

- Avg Townhouse: $1.5million
- TQD Townhouse: $1.2million

Laundry Haus

- Land Cost: $44million
- Construction Cost: $48million

Average home debt to income ratio

- Canada: 177%
- Vancouver: 208%

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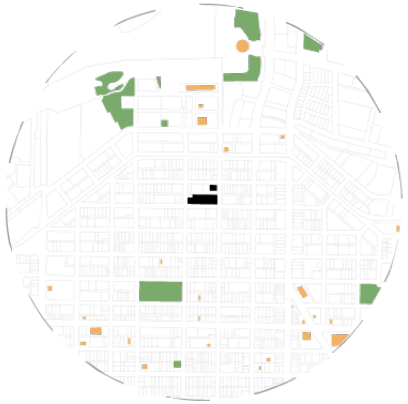
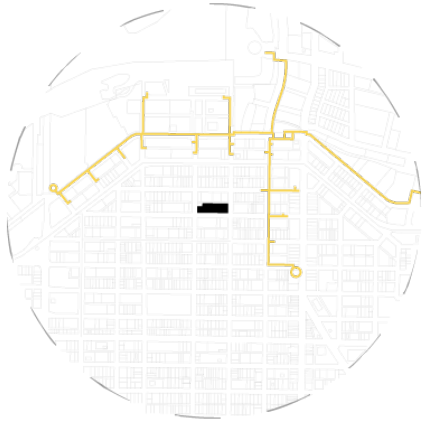
10 minute walk radius



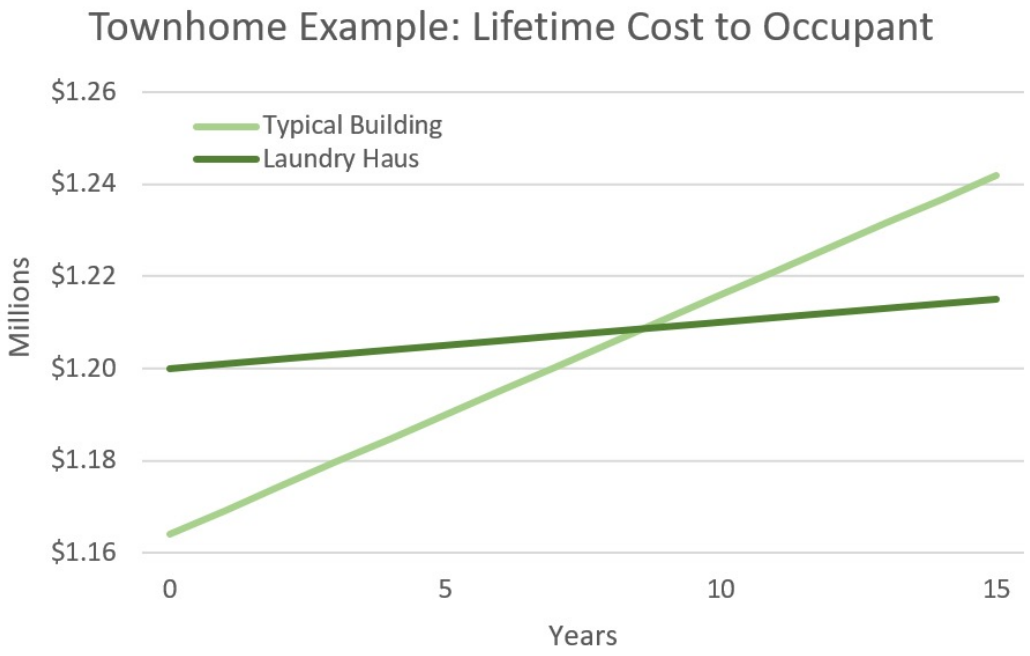
daily amenities

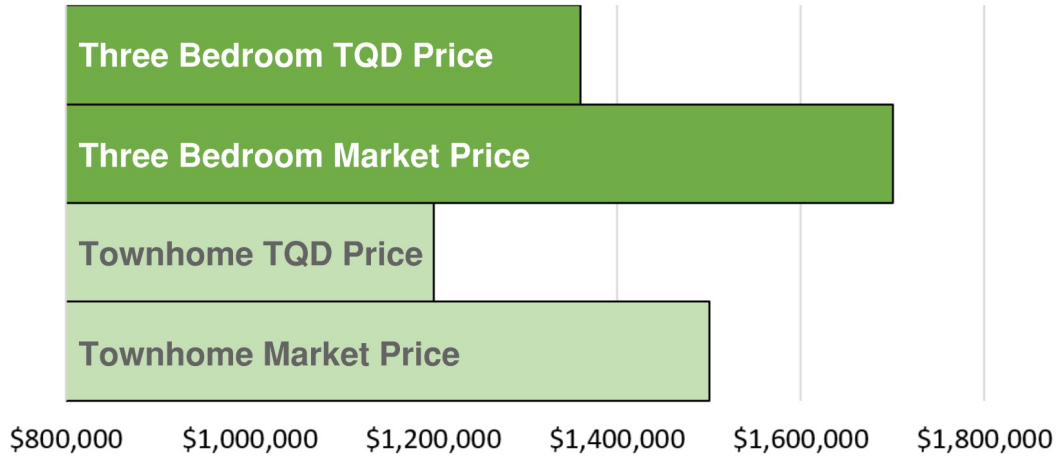
transit network



district energy

below market ownership & rental





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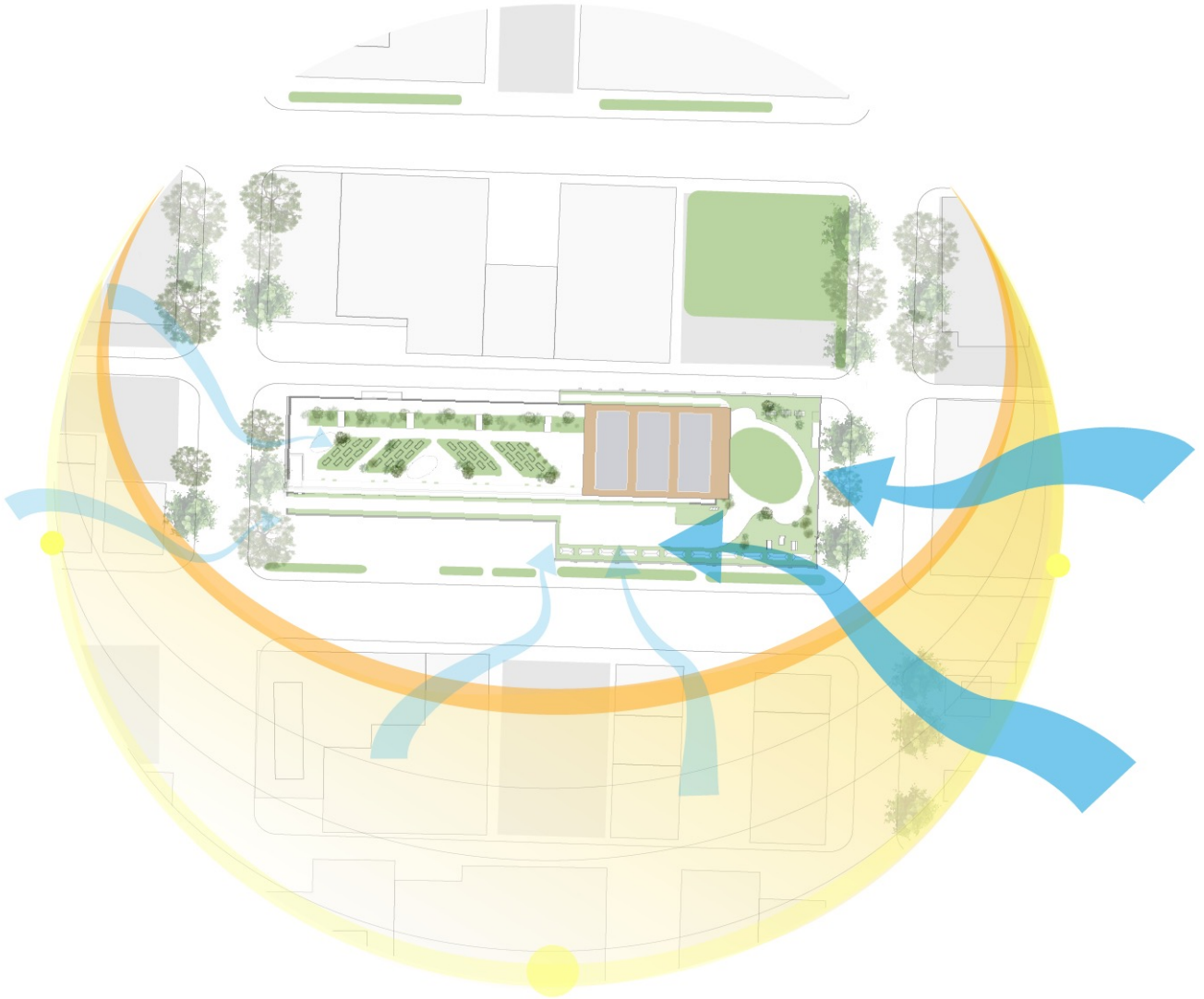
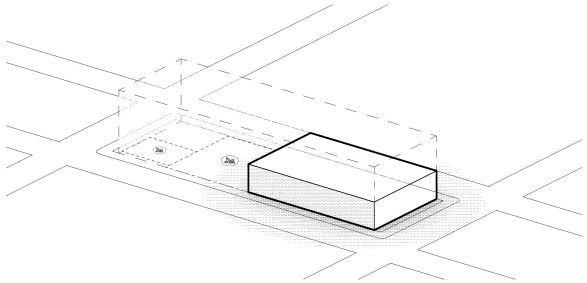
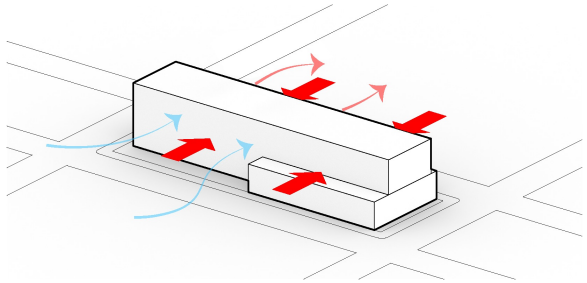
site



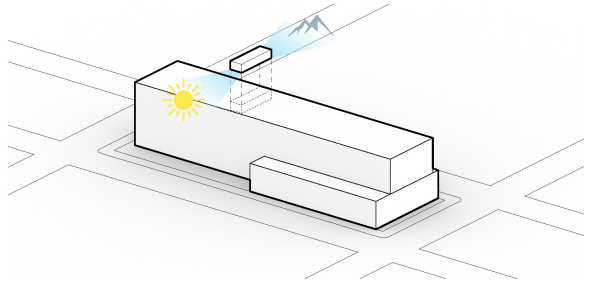
form



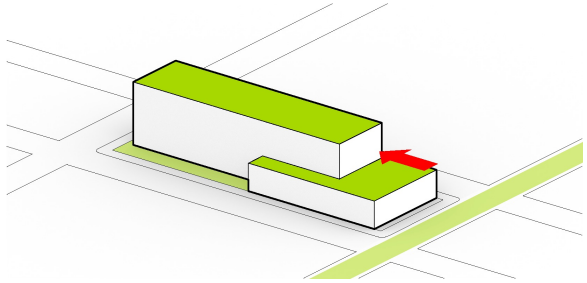
buildable area



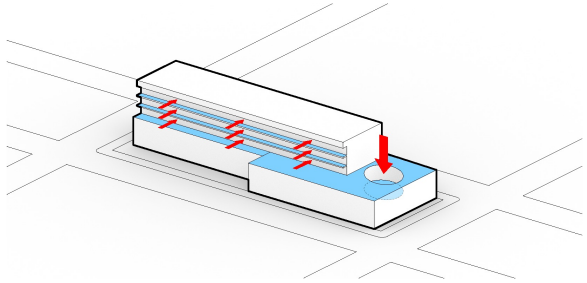
north/south cross ventilation



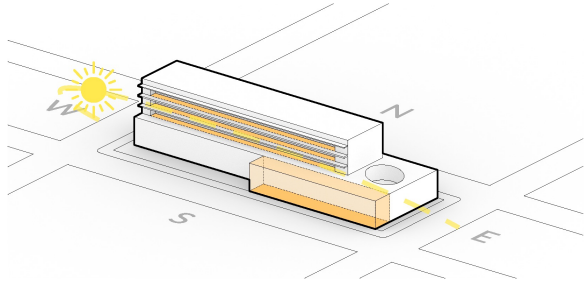
north/south exposures in units



maximize greenspace



exterior circulation



south buffer spaces

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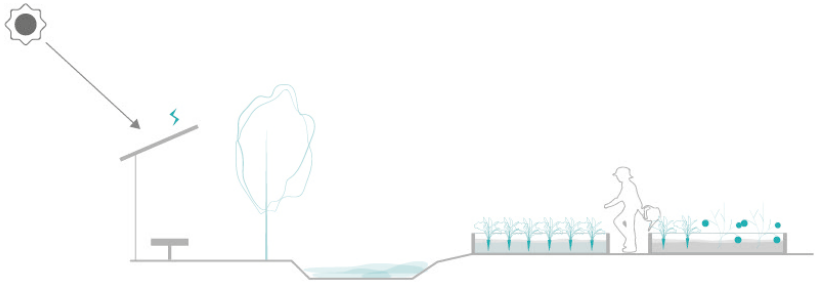
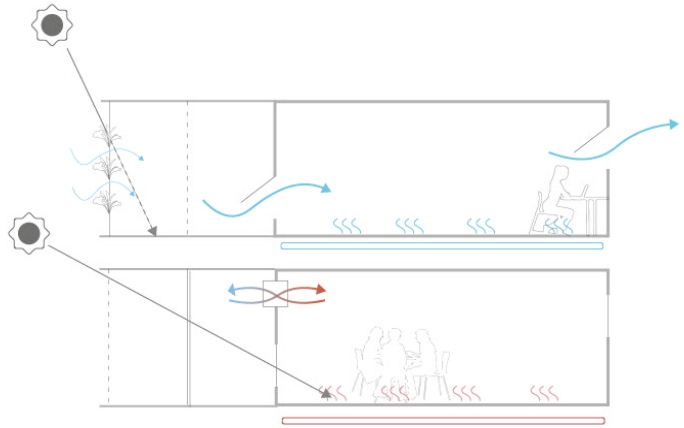
guiding principles

Holistic

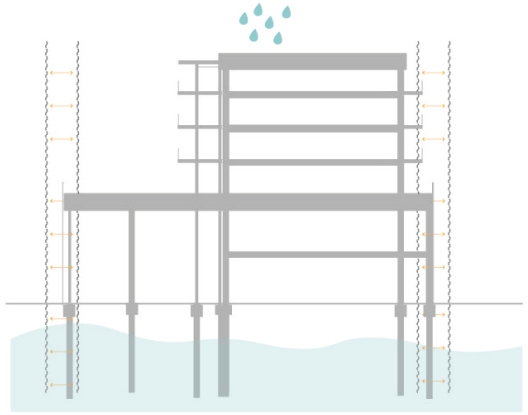
Regenerative



Comfortable



Resilient



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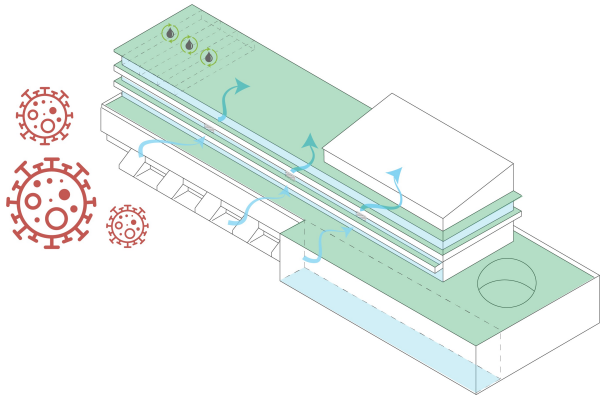
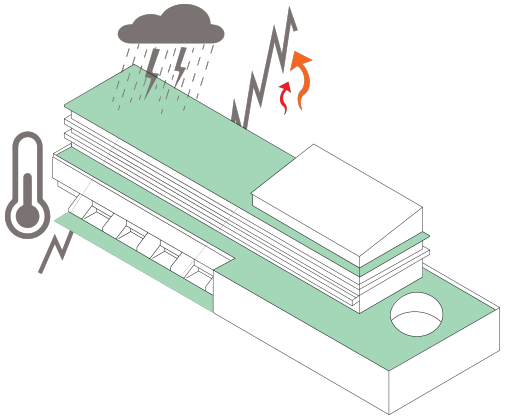
resilient

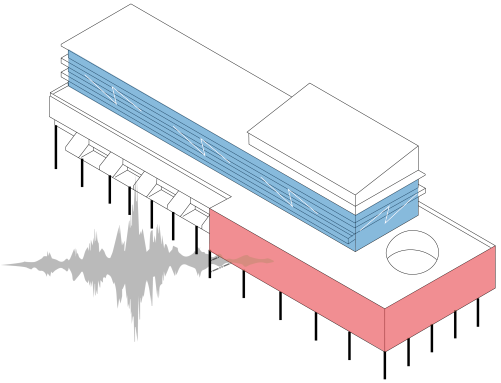
prepared for hazards



environmental



climate



seismic

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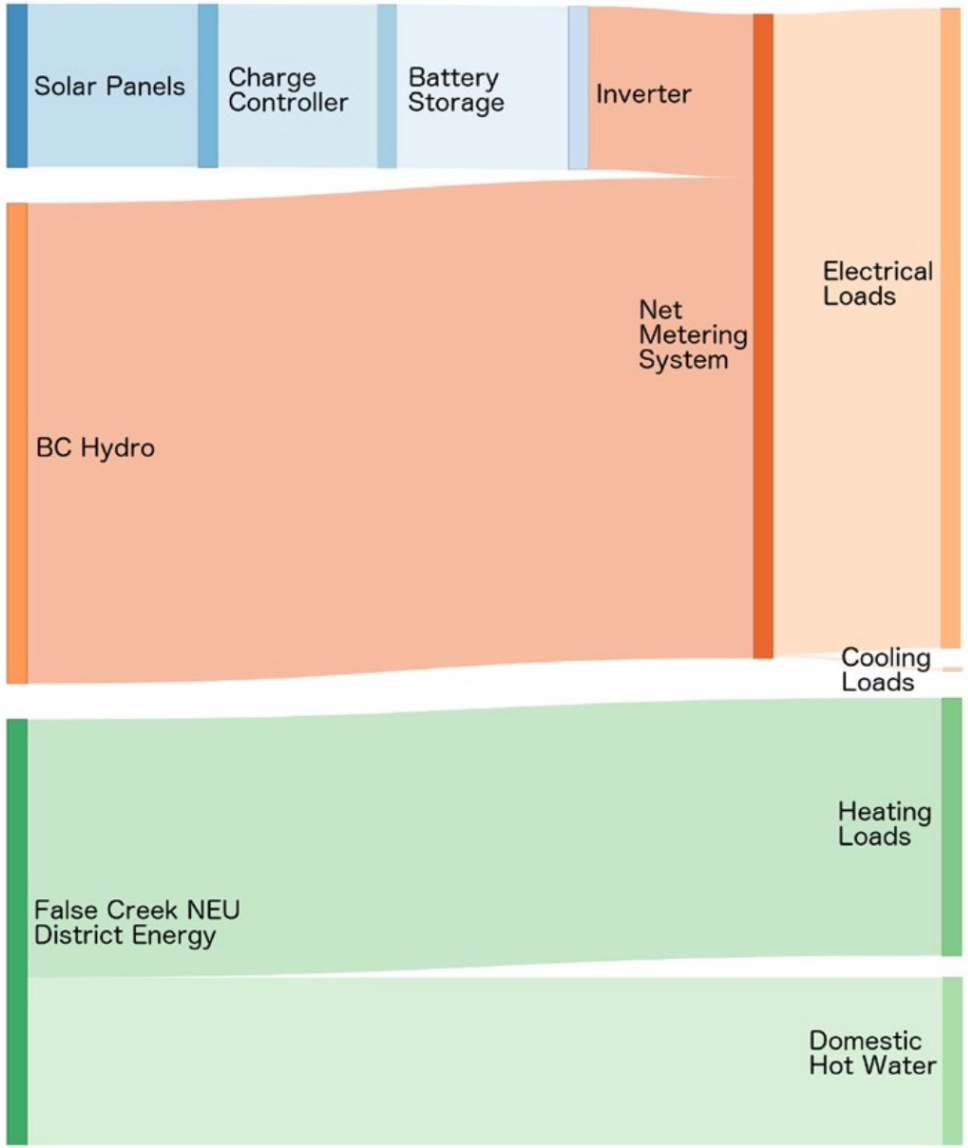
energy flow



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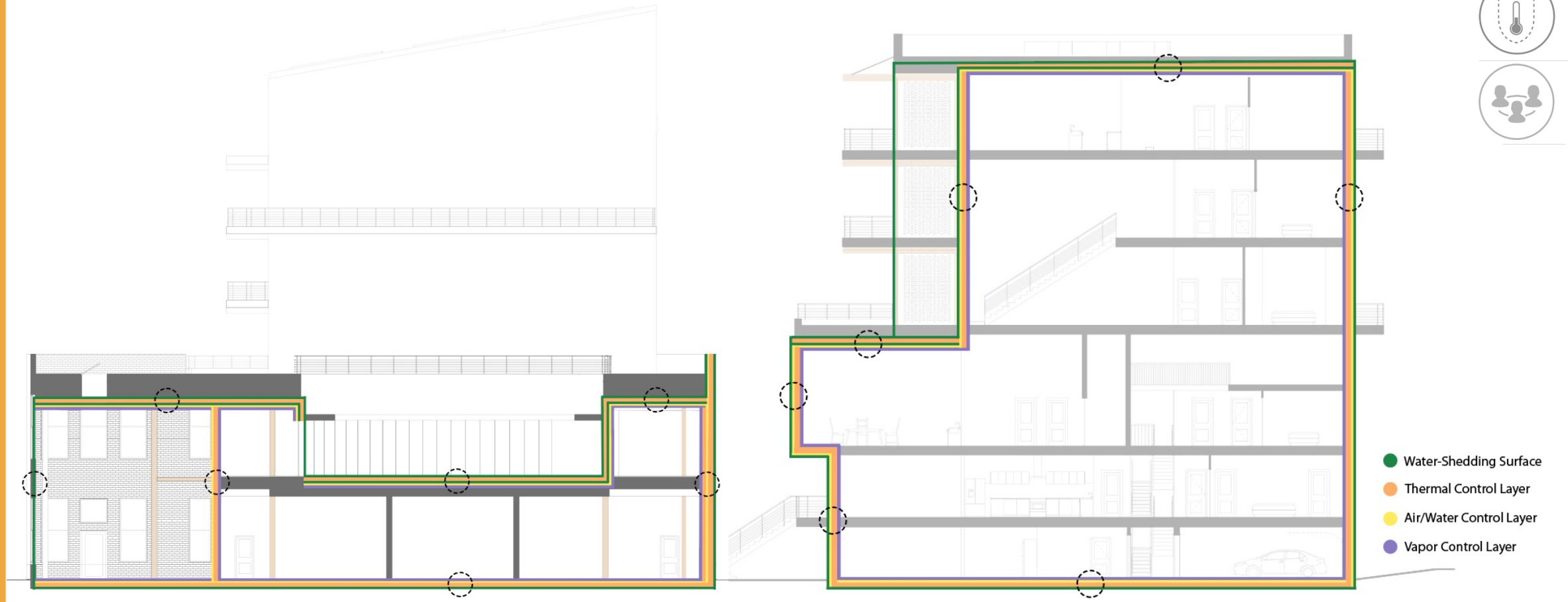
buffered building envelope



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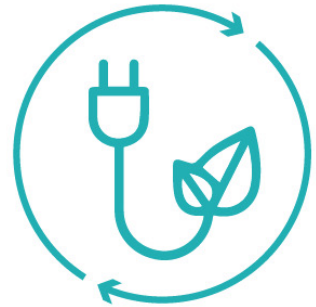
regenerative



adaptive reuse

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Reused

1. First floor columns and beams
2. Brick facade
3. Oak hardwood flooring
4. Removed beans ripped for use on Gazebo and forming material

   Existing structural grid
5. Removed brick used to create apartment partition walls
6. Concrete from eastern half of slab retained and western half used for aggregate

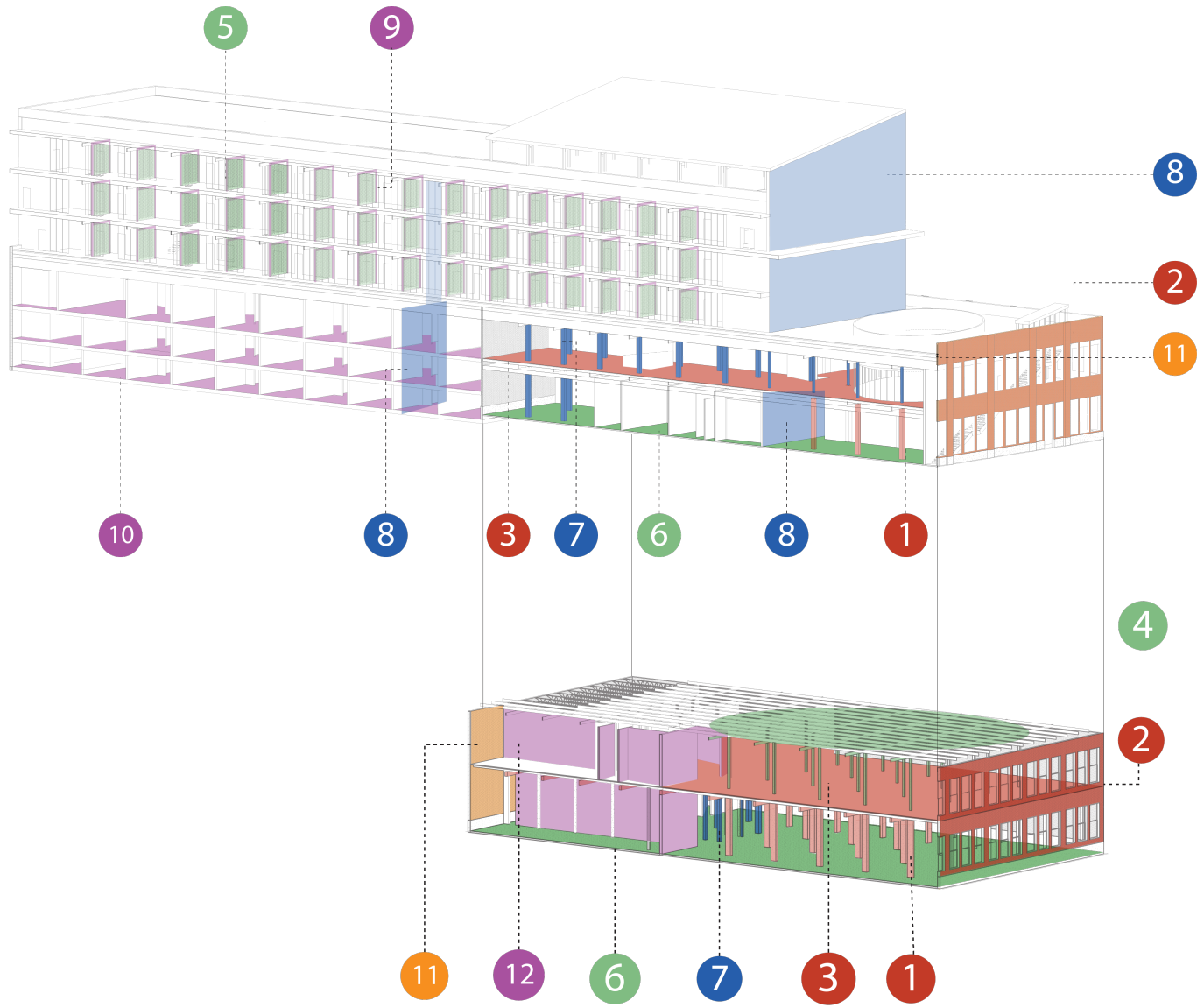
Upgrades

7. Undersized columns on 1st and 2nd floor upgraded
8. CLT gravity/shear walls installed
9. Structurally separate Glulam Columns and beams used for supporting apartment decks
10. DLT with concrete topping used for new flooring system
11. Centre core and timber strong back support for existing facade

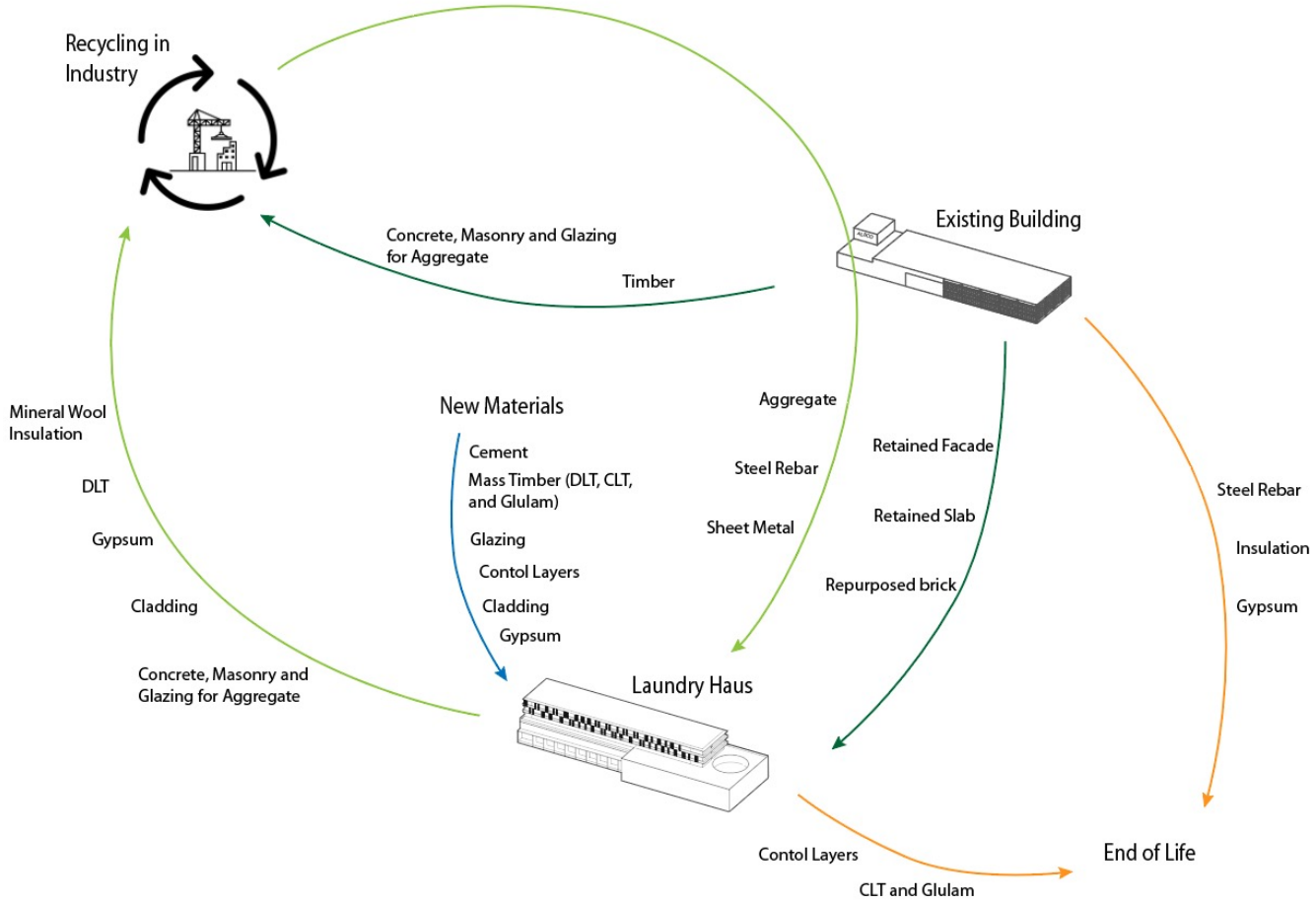
    Reinforced concrete jacketing of piles and new foundation for west side

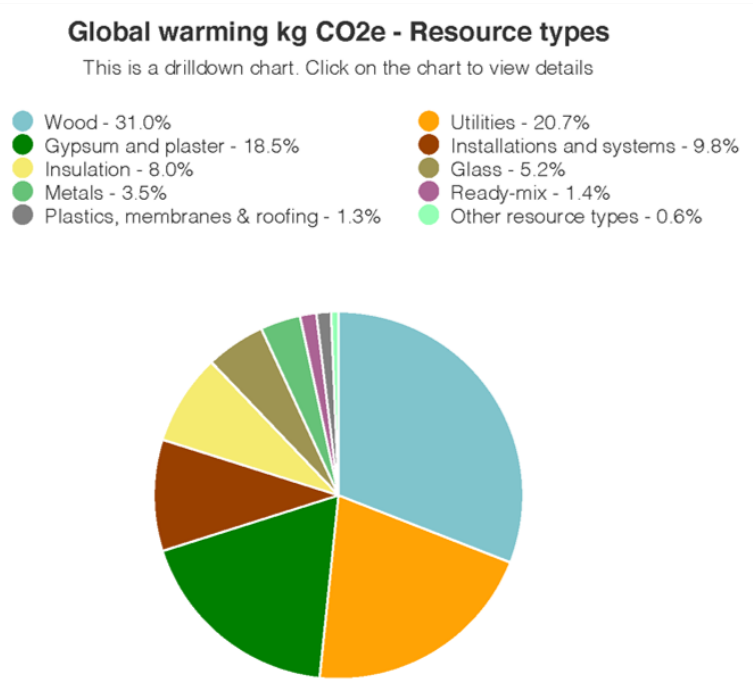
Removed

4. 2nd floor beans and columns removed for unken playground
12. Interior light timber framed and concrete block walls



closing the loop





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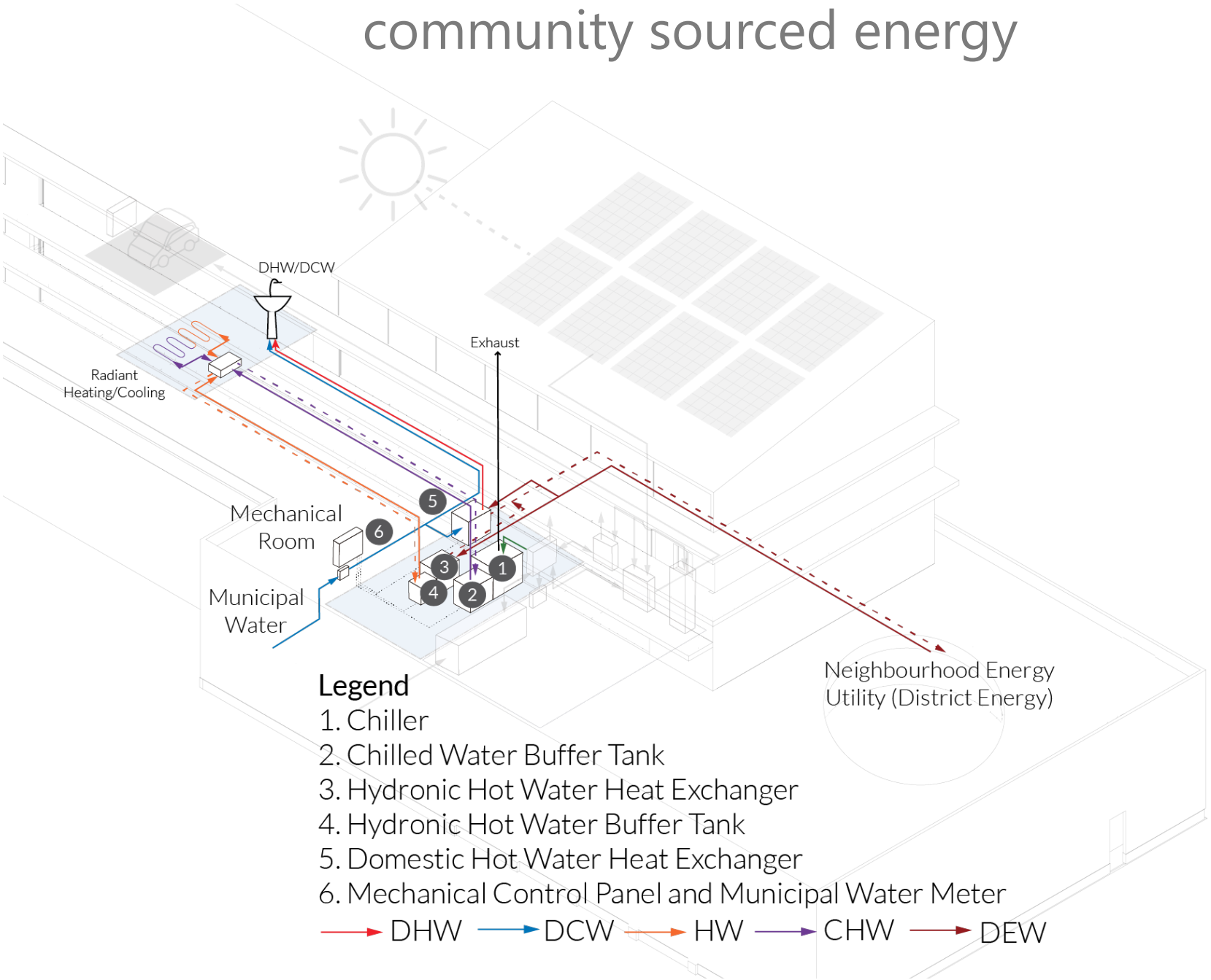
community sourced energy

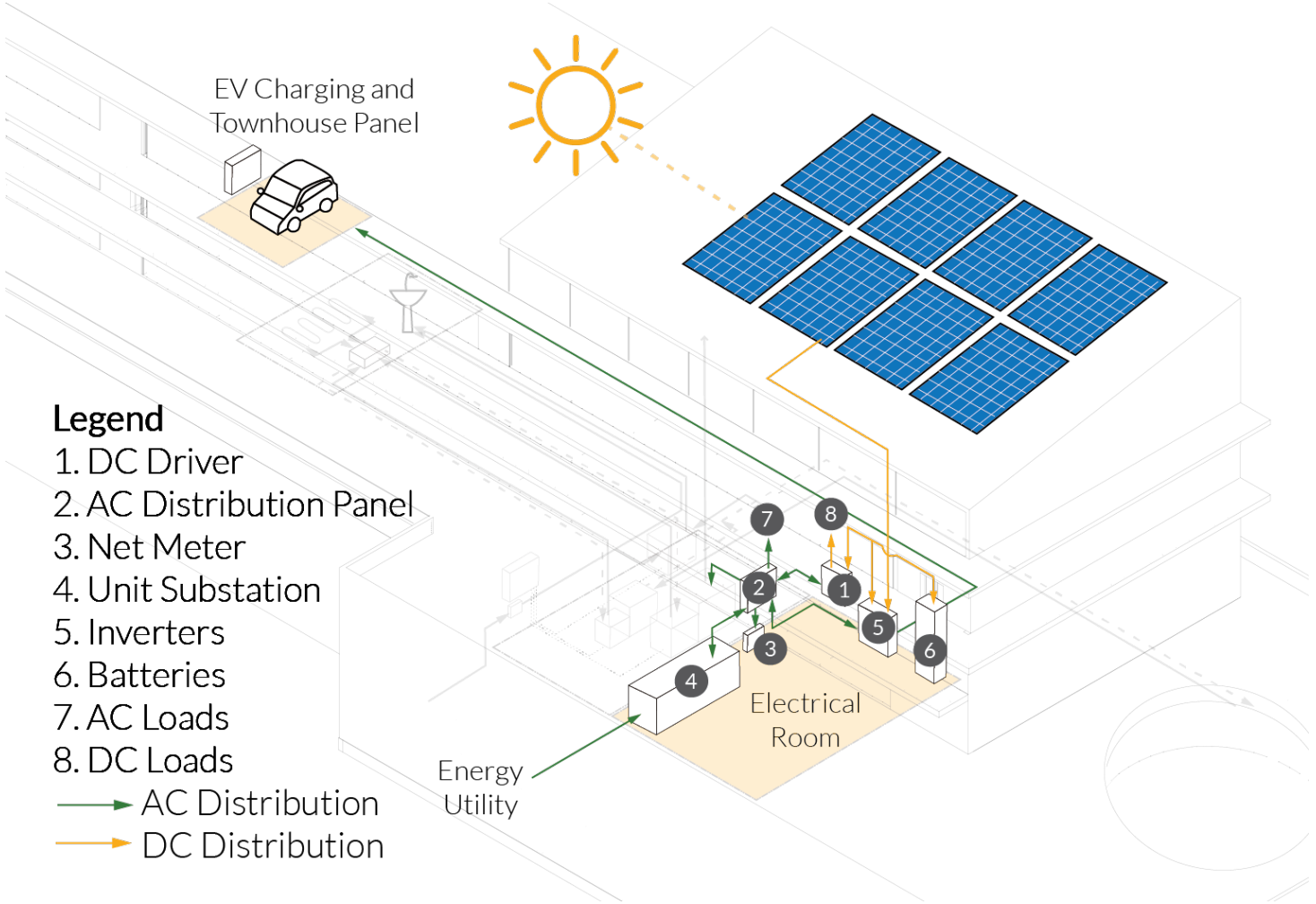


Legend

1. Chiller
2. Chilled Water Buffer Tank
3. Hydronic Hot Water Heat Exchanger
4. Hydronic Hot Water Buffer Tank
5. Domestic Hot Water Heat Exchanger
6. Mechanical Control Panel and Municipal Water Meter

→ DHW → DCW → HW → CHW → DEW

virtual power plant



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comfortable

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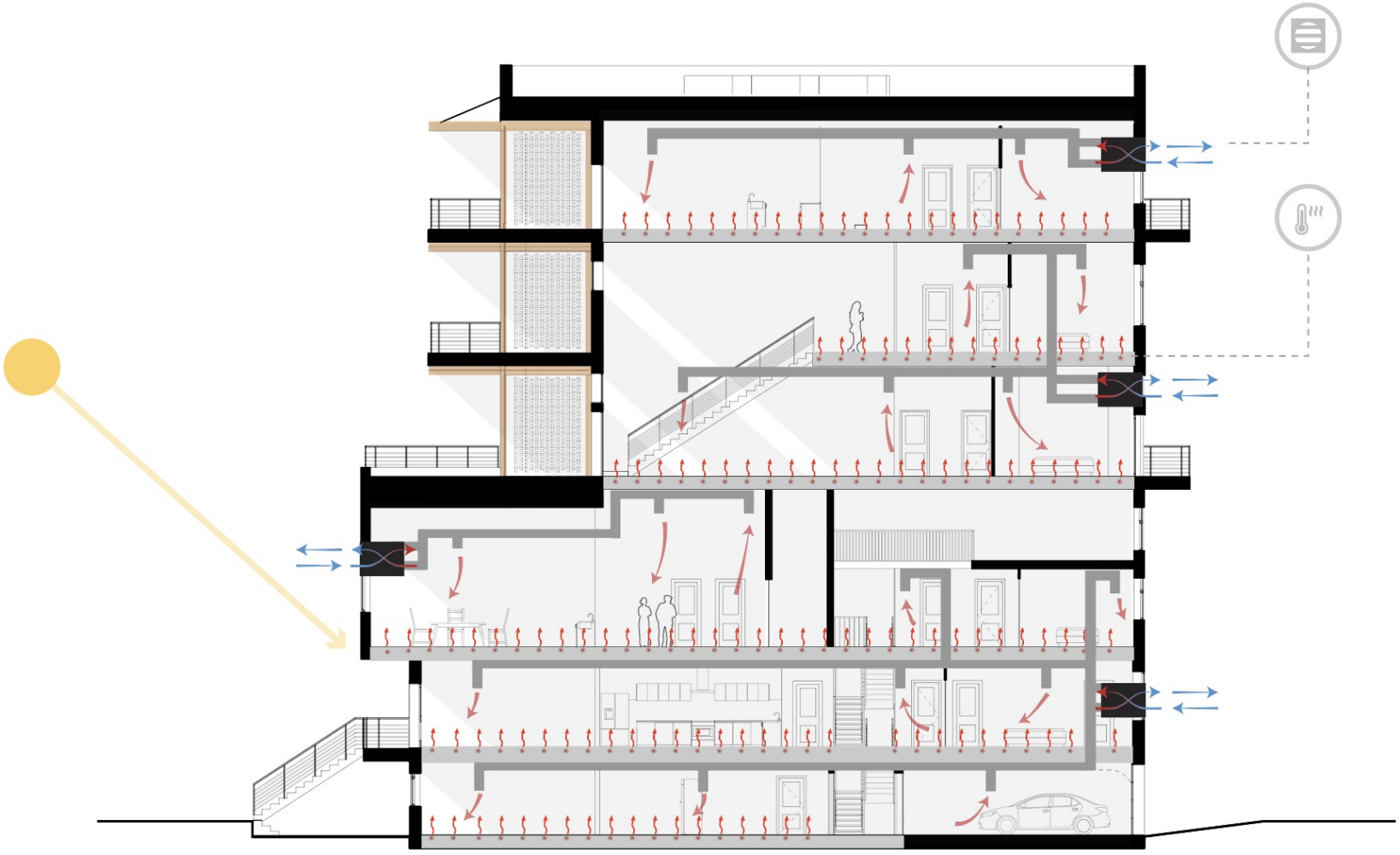
warm where it matters



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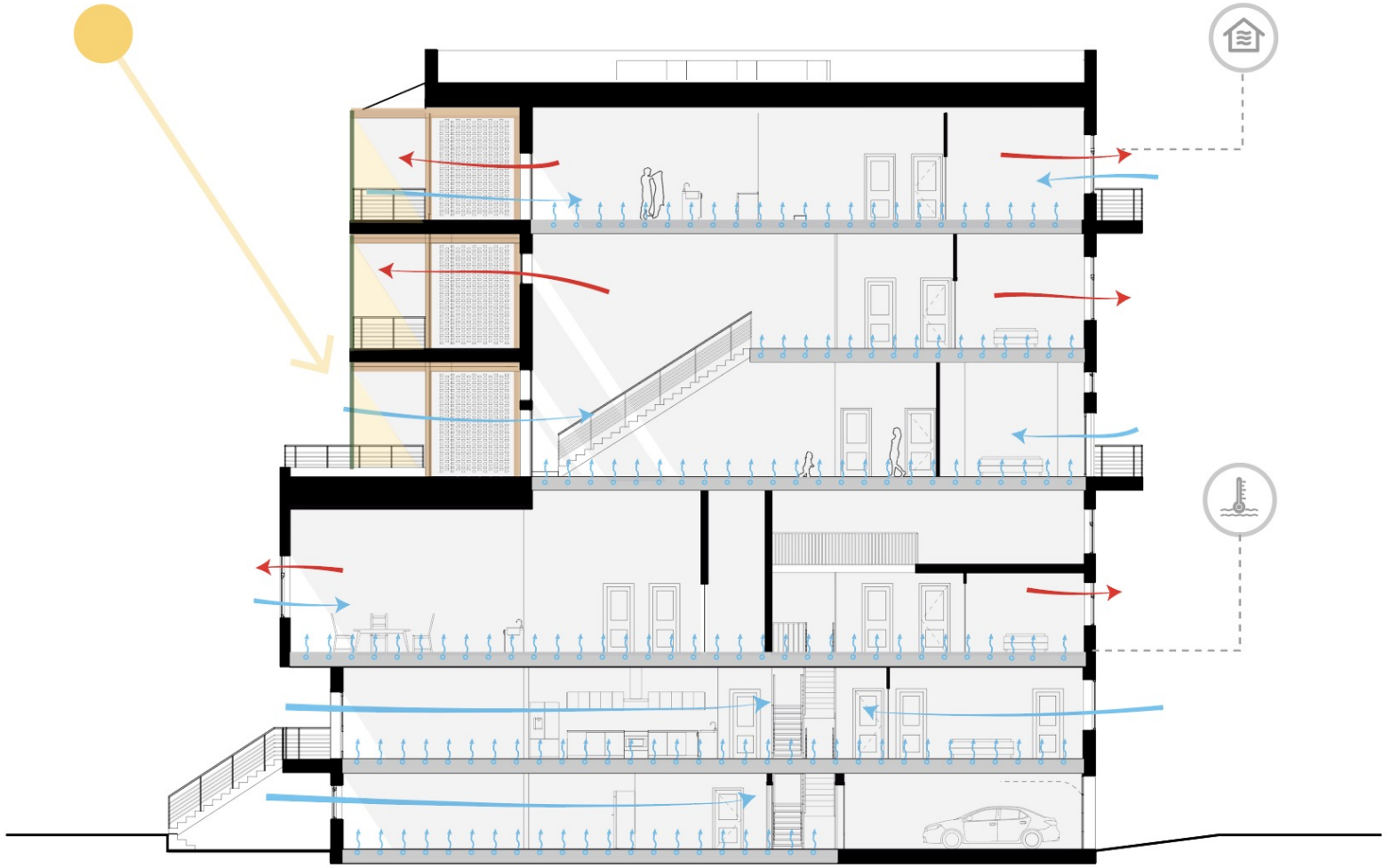
naturally cool



an adaptable envelope

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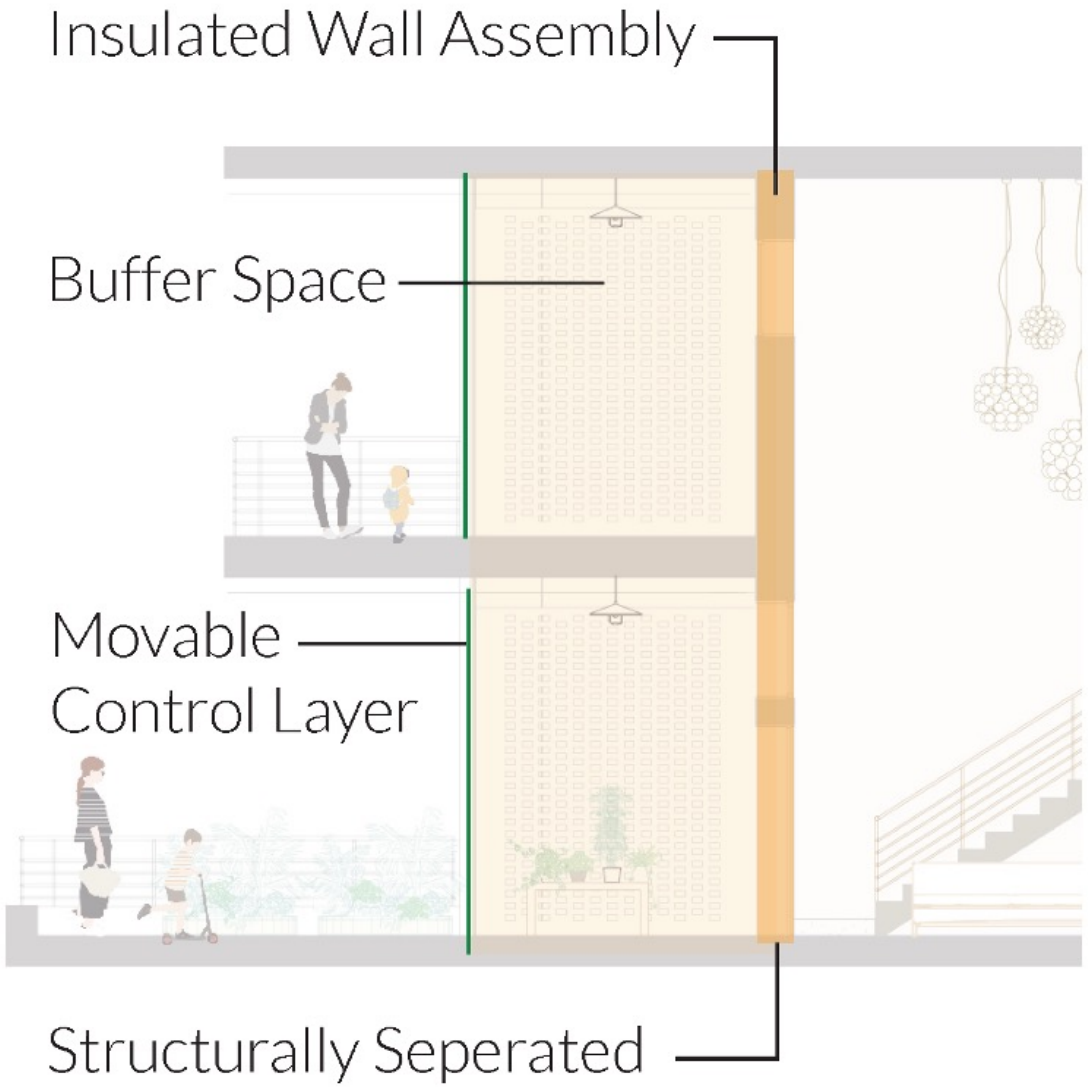
an adaptable envelope



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holistic

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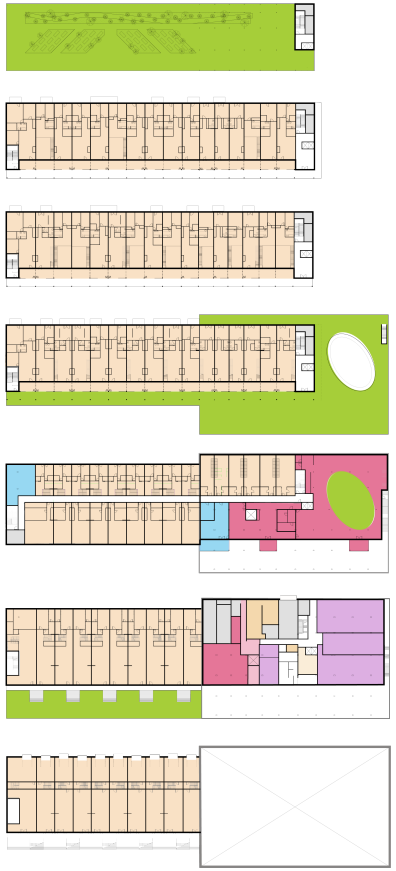
serving the community



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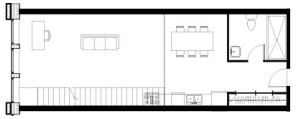
diversity of housing

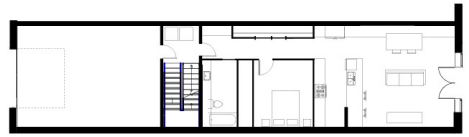
2 Bedroom

3 Bedroom



Loft

1 Bedroom



Townhouse

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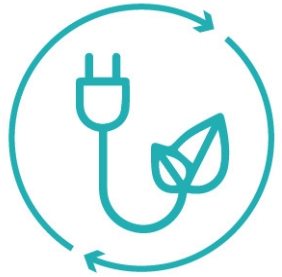
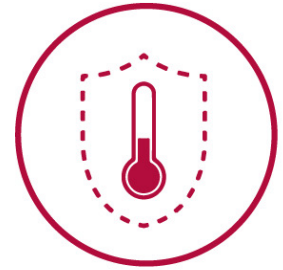
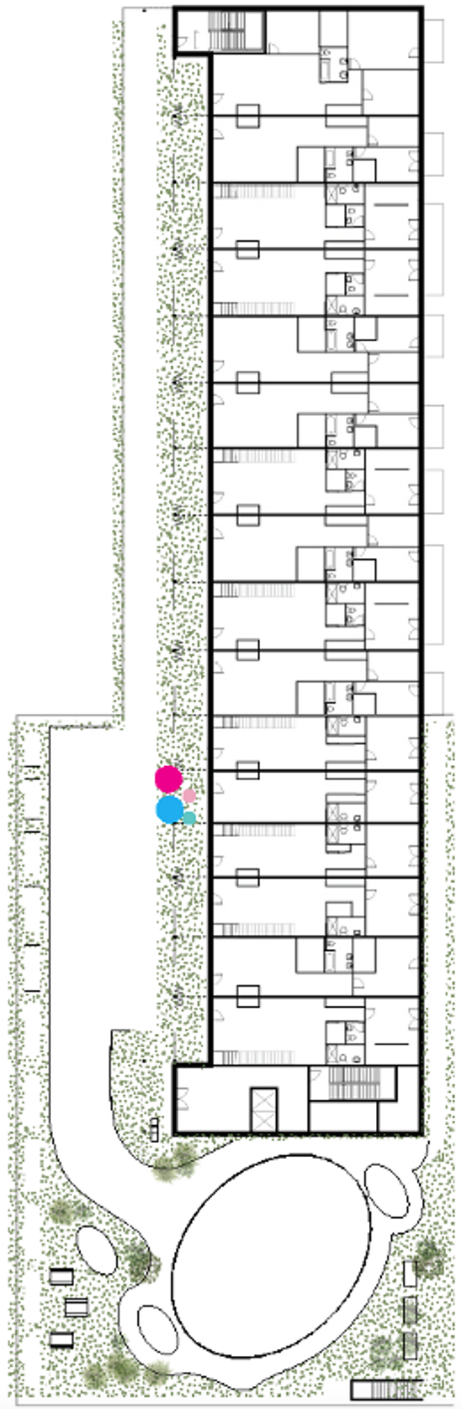
day in the life







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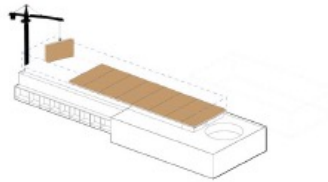
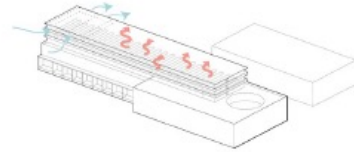
panelized construction



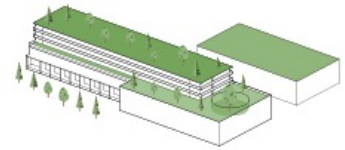
Prefabricated, carefully machined CLT and DLT panels make up our project's exterior walls and floor cassettes respectively. This prefab method allows for high quality, fast, and minimally disruptive construction.

mixed-mode



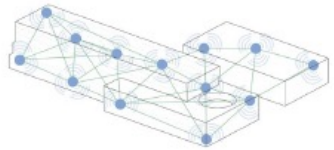
The decentralized ventilation system uses heat recovery ventilators paired with natural ventilation to provide the perfect indoor climate. Using intelligent controls, cooling strategies for each space maximizes internal air quality, occupant comfort, and energy efficiency.

generous greenspace



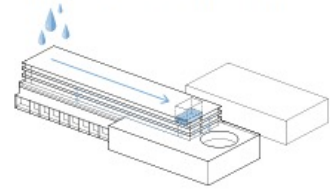
The greenspaces will provide both environmental as well as psychological benefits. They are woven throughout the building and will feature closed-loop community gardens, play spaces for children and plants which act as carbon sinks.

smart building systems



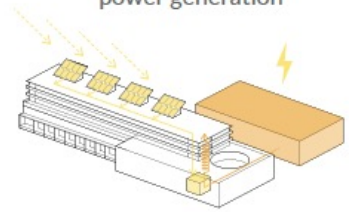
By leveraging data collection and reinforcement learning models, the building systems adapt to occupancy patterns and external weather conditions to optimize energy efficiency without compromising occupant comfort.

smart water management



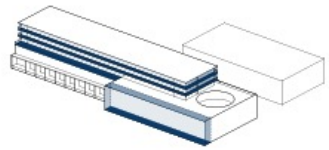
By focusing on conservation through rainwater harvesting and in-unit grey-water recycling systems, potable water usage is significantly decreased and building occupants are rewarded with fresh produce from vertical hydroponic gardens.

power generation



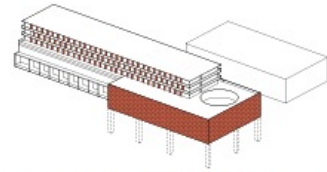
Onsite power generation comes in the form of a photovoltaic array and is optimized to specifically meet the additional cooling requirements associated with the high-performance building envelope on warm, sunny days.

buffer spaces



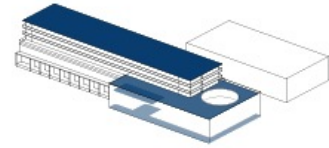
The atrium and sunroom/porches on the south façade are unheated spaces which serve as environmental buffers that provide a gradient between the private and public realm for richer community life.

adaptive reuse



Laundry Haus adapts key building components such as the foundation and brickwork to meet the needs of the new structure. Additionally, by re-using demolished materials, we give new life to what would usually become construction waste.

gathering spaces



By providing a variety of formal and informal spaces to gather throughout the building, residents can create a more complete community.

THANK YOU


RDH
BUILDING
SCIENCE


rjc

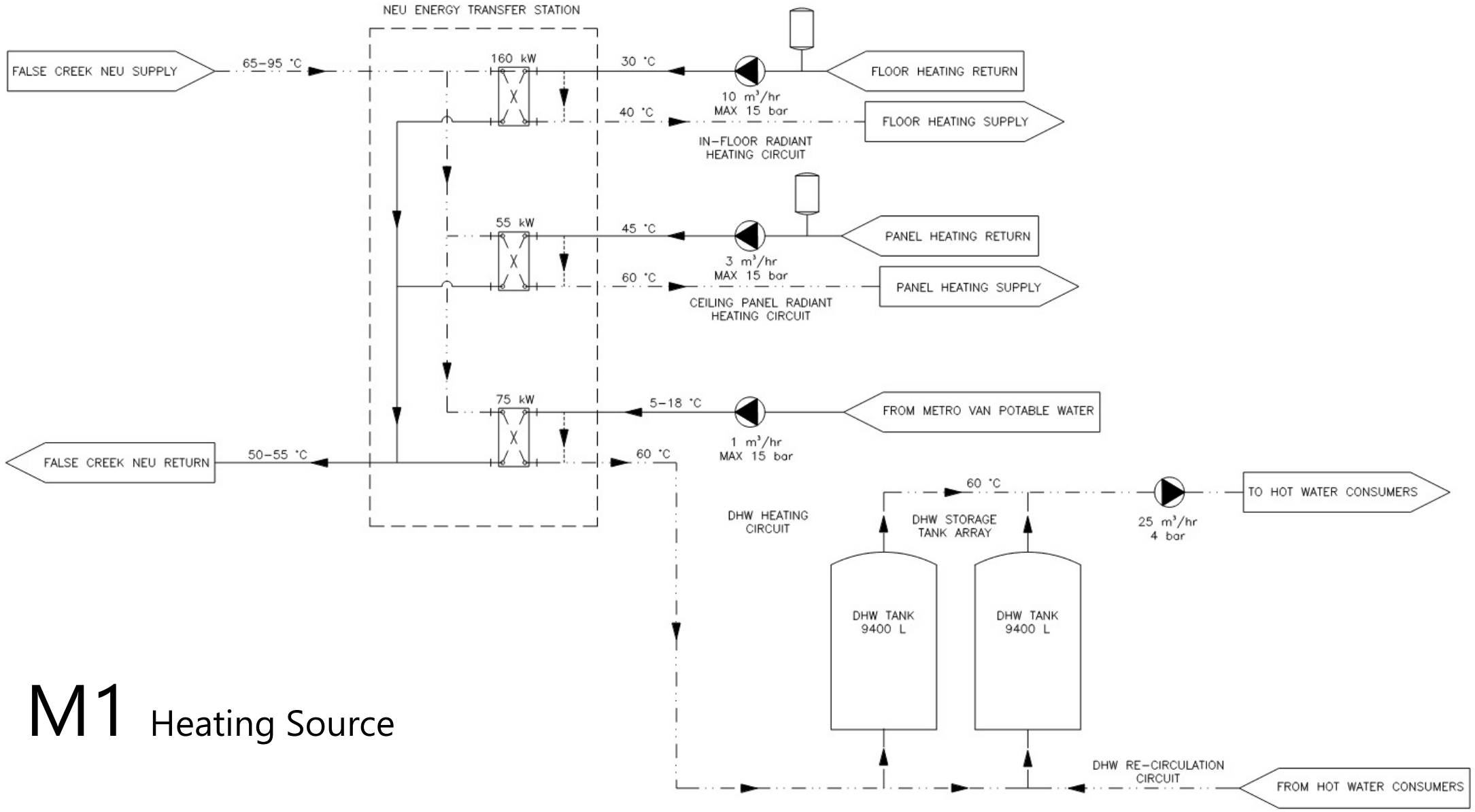

catalyst


FRANCL
ARCHITECTURE

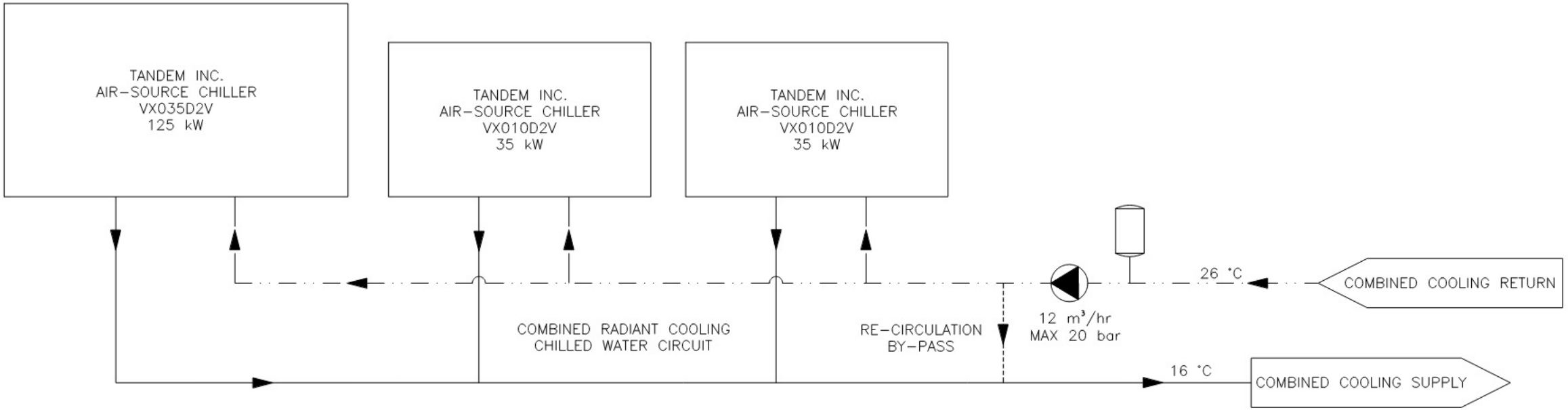

INTEGRAL
GROUP

LAUNDRY HAUS

APPENDICES



M1 Heating Source



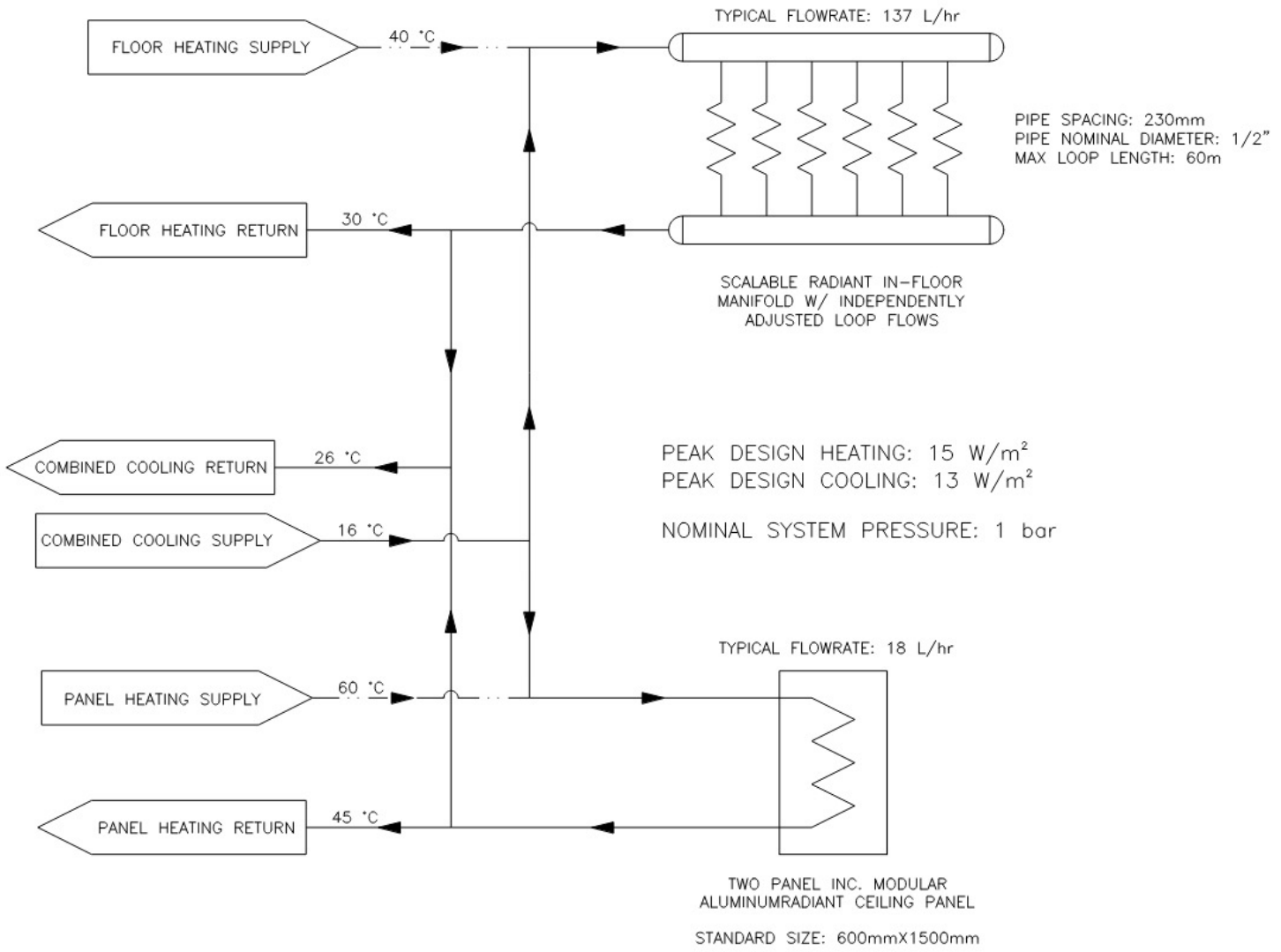
LEGEND:

- FLAT PLATE COUNTER-FLOW HEAT EXCHANGER - ALFA LAVAL OR EQUIVALENT
- DUPLEX CENTRIFUGAL VSD PUMPS (SEE MANUFACTUER'S RECOMMENDATIONS FOR INSTRUMENTATION AND CONNECTIONS)
- FLOW DIRECTION
- HOT WATER SOURCE PIPE
- COLD WATER RETURN PIPE
- EMERGENCY OR RE-CIRCULATION BY-PASS CONNECTION
- DIAPHRAGM-TYPE EXPANSION TANK (MIN 25L)

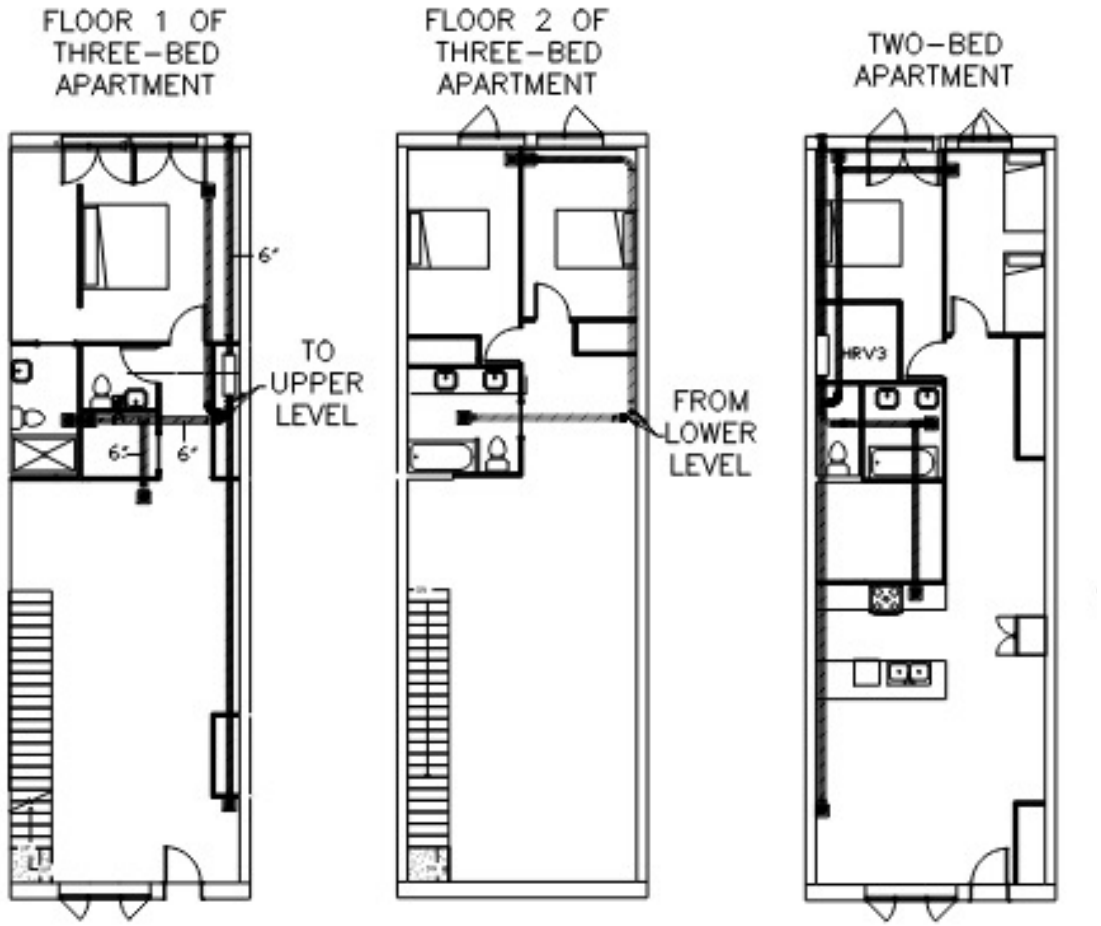
M1 Cooling Source

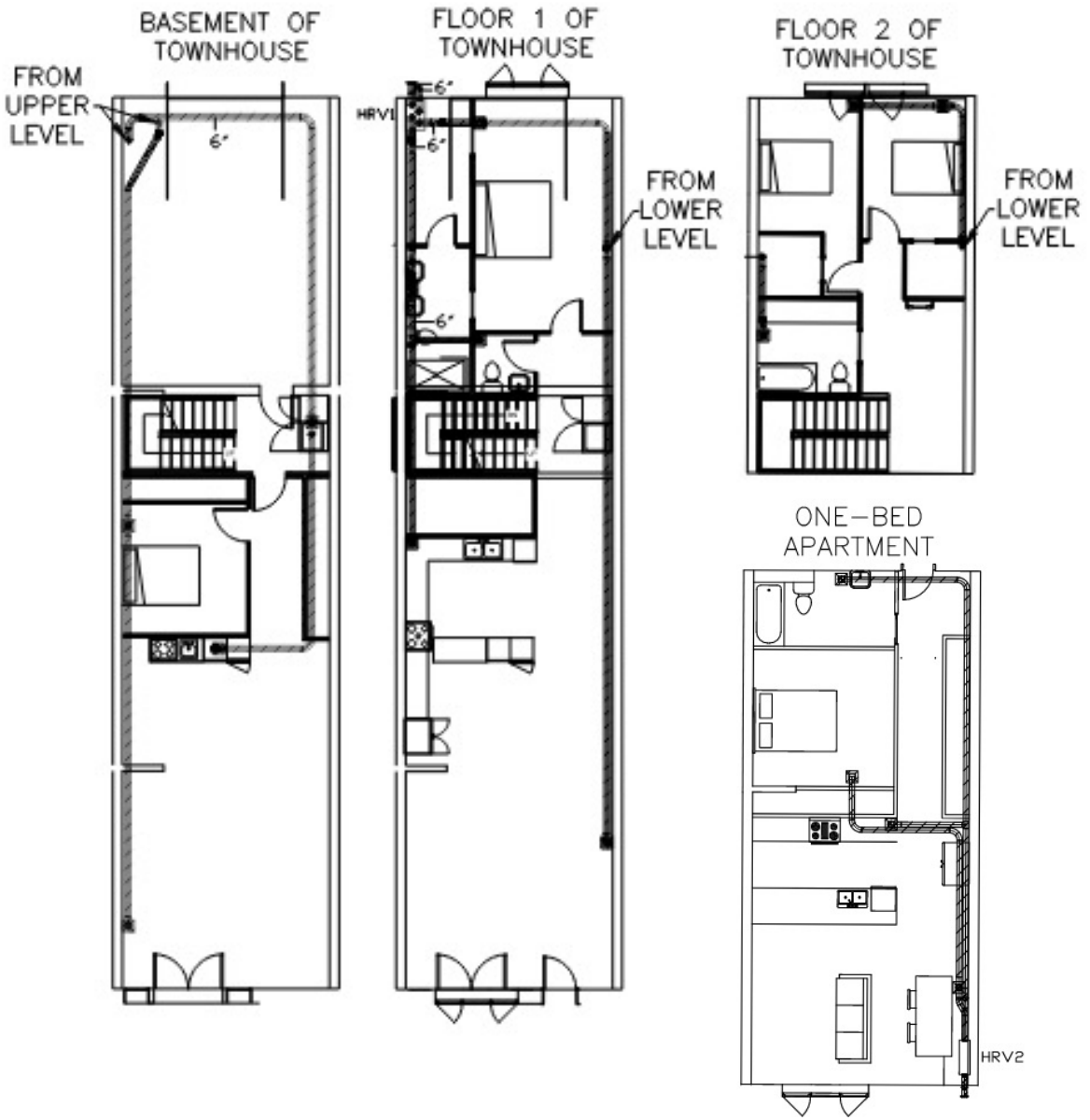
REPRESENTATIVE 4–PIPE DISTRIBUTION SYSTEM
FOR INDEPENDENT HEATING AND COMBINED COOLING

RADIANT ELEMENTS ADDED IN PARALLEL



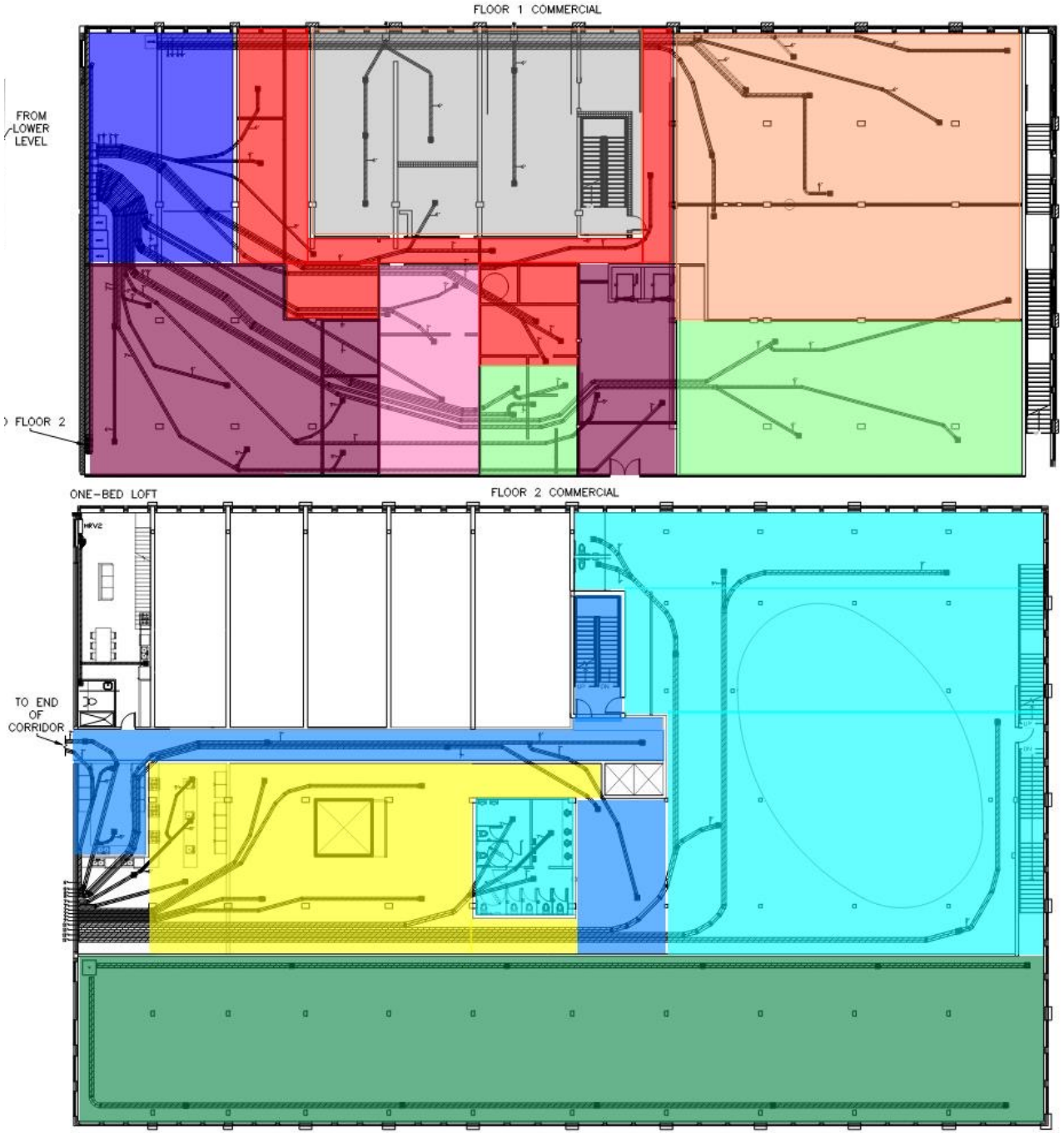
M2 Radiant Supply

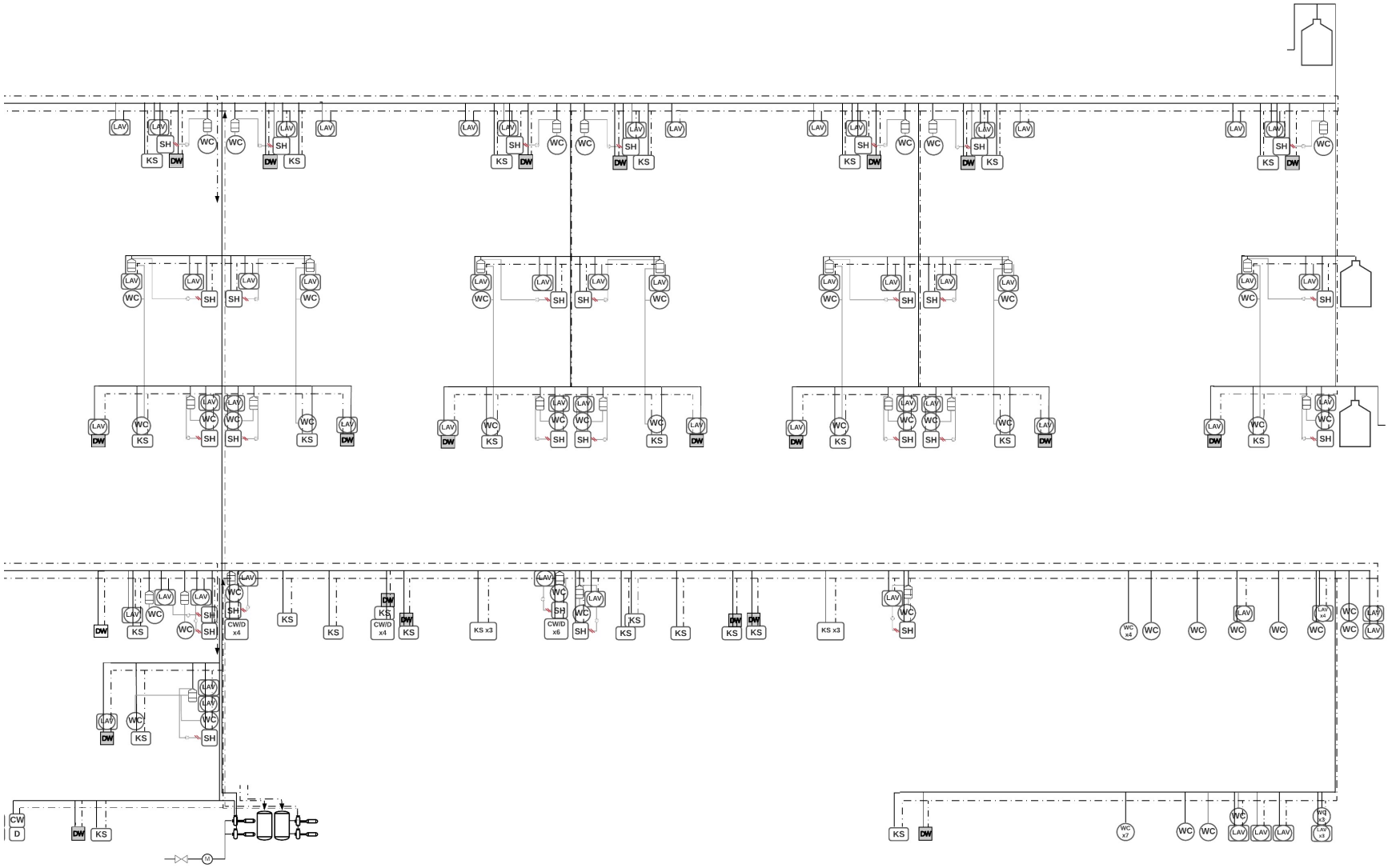




M3 Residential Ductwork

M3 Commercial Ductwork
Showing Shared HRV



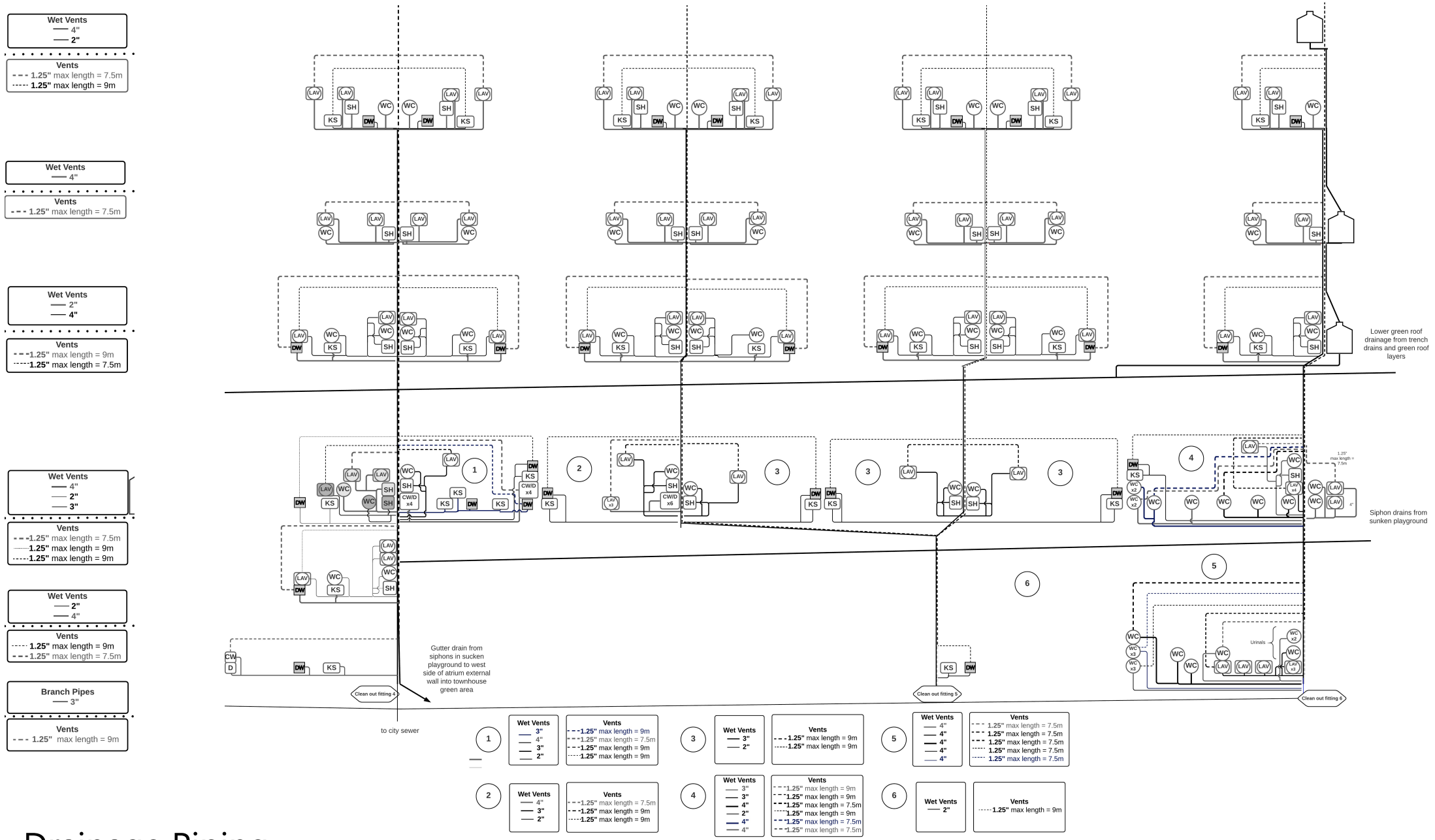


Notes
All non-vertical pipe slopes = 1/50.
All waste drainage stacks are 6" in diameter.
DHW and DCW valve located at junction to each unit and at every fixture.
Fixtures are all at the same elevation but shown stacked due to section view.
15-micron bag filter included within each gray water tank.

- DHW
- DHW Recirculation
- DCW
- Gray Water
- Watering Connection
- Joulia Heat Exchanger
- In-line Centrifugal Pump
- 2500 gal DHW Storage Tank
- 95ft head, 80 gpm Booster Pump
- 132 gal Rainwater Tank
- 6 to 24 gal Gray Water Tank
- Water Meter

M4 Supply Piping

M4 Drainage Piping



M5

Mechanical Schedules

VENTILATORS														
Tag No.		HRV1	HRV2	HRV3	HRV4	HRV5	HRV6	HRV7, HRV10	HRV8	HRV9, HRV 11	HRV12	E1, E2	HRV12	V
LOCATION		TOWNHOUSE	LOFTS, ONE BED APARTMENTS	TWO AND THREE BED APARTMENTS	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	BIKE PARKING, LOADING BAY	MECHANICAL ROOM	ATRIUM
SERVICE		HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	HEAT RECOVERY VENTILATION	EXHAUST FAN	HEAT RECOVERY VENTILATION	SUPPLY FAN
MANUFACTURER		VENMAR	ZEHNDER	VENMAR	LIFEBREATH	LIFEBREATH	LIFEBREATH	ZEHNDER	ZEHNDER	ZEHNDER	ZEHNDER	SOLER PALAU CANADA	ZEHNDER	SOLER PALAU CANADA
MODEL		AVS X30HRV ECM	COMFOAIR 160 HRV	EVO5 700 HRV HEPA	1500I-ECM	650 FD	455 FD	Q450 TR HRV	COMFOAIR 550 HRV	COMFOAIR 550 HRV	Q600 ST HRV	eSQD 8	Q600 ST HRV	eSQD 10
DIMENSIONS (L x W x H)	mm	818 x 510 x 843	864 x 268 x 670	965 x 286 x 445	1116 x 1695 x 940	1066 x 1371 x 62	737 x 845 x 730	790 x 850 x 580	724 x 800 x 563	724 x 800 x 563	790 x 850 x 580	406 x 406 x 432	790 x 850 x 580	482 x 482 x 508
WEIGHT	kg		30	22.5	109	54	32	50	47	47	50	27	50	34
POWER	W	135	67	68	745.7	186	124	130	110	110	208	186	208	373
THERMAL YIELD	%	75	85	75	65	82	60	88	90	90	80	-	80	-
CAPACITY	CFM	50-278	19-92	50-104	1500	650	450	265	324	324	353	820	353	1578
FILTER		HEPA	HEPA	HEPA	MERV6	WASHABLE	WASHABLE	MERV 13	MERV 13	MERV 13	MERV 13	FILTER BOX	MERV 13	FILTER BOX
DUCT DIAMETER	in	6	5	5	19 x 17	20 x 8	14 x 8	6.3	7	7	7.1	11	7.1	13

PUMPS						
Tag No.						
LOCATION		MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	RESIDENTIAL BATHROOMS
SERVICE		IN-FLOOR RADIANT HEATING	PANEL RADIANT HEATING	RADIANT COOLING	DHW/DCW PRESSURE BOOSTER	GRAY WATER
MANUFACTURER		ROTECH INC.	ROTECH INC.	ROTECH INC.	GRUNDFOS	PAWFLY
MODEL		1196 LF	1196 LF	1196 LF	CM 15-2 A-R-A-E-AVBE C-A-A-N	6FT LIFT IN LINE PUMP
STYLE		CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL	HORIZONTAL END SUCTION	CENTRIFUGAL
FLOWRATE	L/S	2.8	0.9	3.3	5	0.42
PRESSURE DROP	KPA	1500	1500	1500	1000	
FLUID		WATER	WATER	WATER	WATER	WATER
PUMP HOUSING		CARBON STEEL	CARBON STEEL	CARBON STEEL	CAST IRON	PLASTIC
IMPELLER MATERIAL		STAINLESS STEEL	STAINLESS STEEL	STAINLESS STEEL	STAINLESS STEEL	
WEIGHT	kg	130	130	130	33.8	
OPERATION		VSD	VSD	VSD		
MOTOR					IEC	
POWER	kW				1.7	0.03
SPEED	RPM	1450-2850	1450-2850	1450-2850	2740-2755	
VOLTAGE/PHASE		220-240V/1 PHASE	220-240V/1 PHASE	220-240V/1 PHASE	220-240V/1 PHASE	

COUNTERFLOW PLATE HEAT EXCHANGERS				
LOCATION		MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM
SERVICE		IN-FLOOR RADIANT	CEILING RADIANT	DHW
MANUFACTURER		ALFA LAVAL	ALFA LAVAL	ALFA LAVAL
MODEL		COMPABLOC CUSTOM	COMPABLOC CUSTOM	COMPABLOC CUSTOM
HEATING CAPACITY	KW	160	75	55

DOMESTIC HOT WATER STORAGE TANKS		
LOCATION	MECH ROOM	
MANUFACTURER		AO SMITH
CAPACITY	L	9400
SIZE (DIA x HEIGHT)	mm x mm	1980x3720
SYSTEM CONNECTION SIZE	mm x mm	3" NPT
MAX WORKING PRESSURE	KPA	860
SHELL MATERIAL		STEEL W/ GLASS LINING

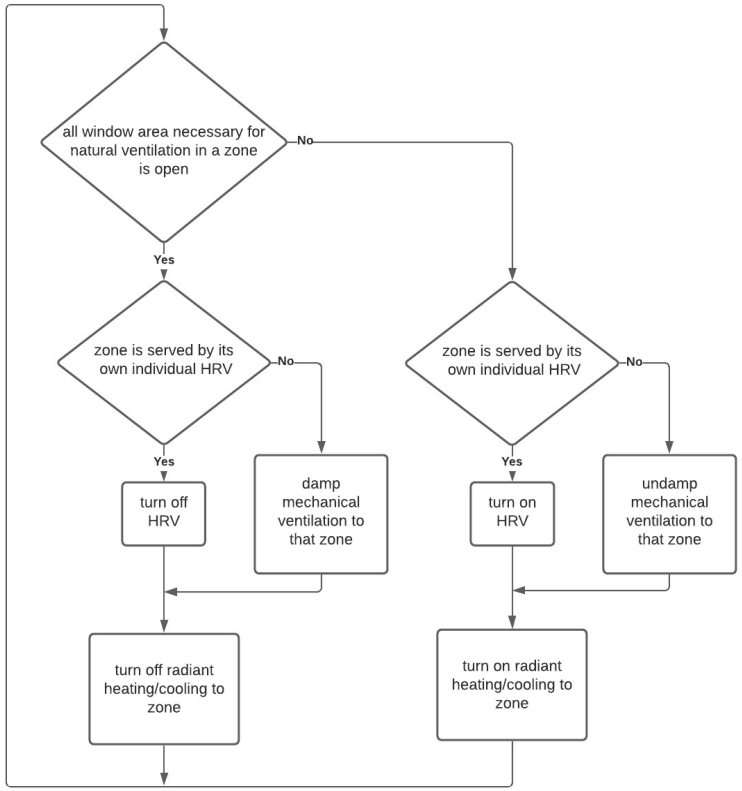
SHOWER PASSIVE HEAT RECOVERY UNIT		
LOCATION		ALL SHOWERS
MANUFACTURER		JOULIA
MODEL		5 PIPE IN FLOOR
% HEAT RECOVERED		60

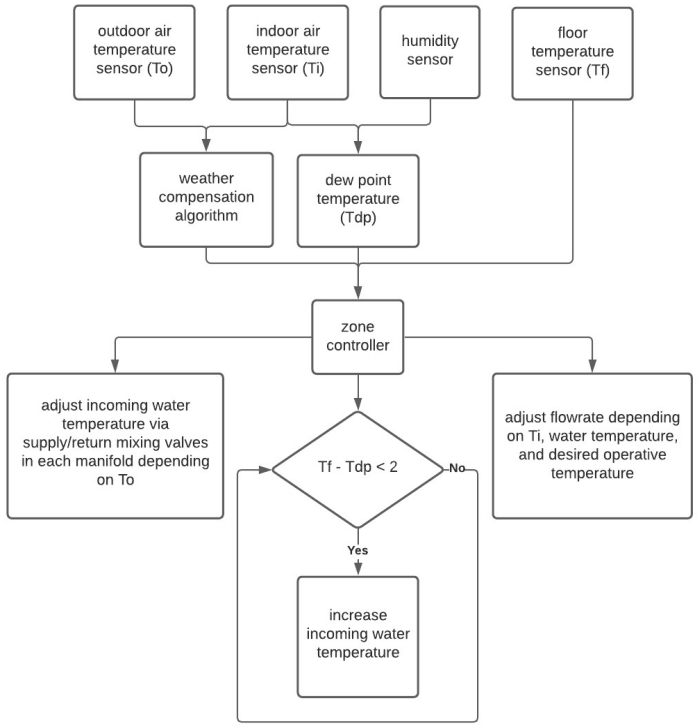
EXPANSION TANKS		
LOCATION		MECHANICAL ROOM
SERVICE		ALL RADIANT HEATING/COOLING
MANUFACTURER		AO SMITH
MODEL		PMI-7
TANK VOLUME	L	27.5
ACCEPTANCE VOLUME	L	17
SIZE (DIA x HEIGHT)	mm x mm	250x500
SYSTEM CONNECTION SIZE	mm	3/4" NPT
SHIPPING WEIGHT	kg	31
MAX. OPERATING TEMP	° C	N/A
MAX WORKING PRESSURE	bar	6.8
SHELL MATERIAL		DRAWN STEEL
DIAPHRAGM MATERIAL		BUTYL RUBBER
COATING		POWDER

AIR-SOURCE CHILLER WITH HIGH STATIC DISCHARGE FANS			
LOCATION		MECHANICAL ROOM	MECHANICAL ROOM
SERVICE		RADIANT COOLING	RADIANT COOLING
MANUFACTURER		TANDEM CHILLERS	TANDEM CHILLERS
MODEL		VX010DZV	VX010DZV
NOMINAL TONS		10	10
FLUID SOURCE/LOAD		AMBIENT AIR	AMBIENT AIR
MASS	KG	570	955
COOLING CAPACITY	KW	35	123
COP		3.5	3.5

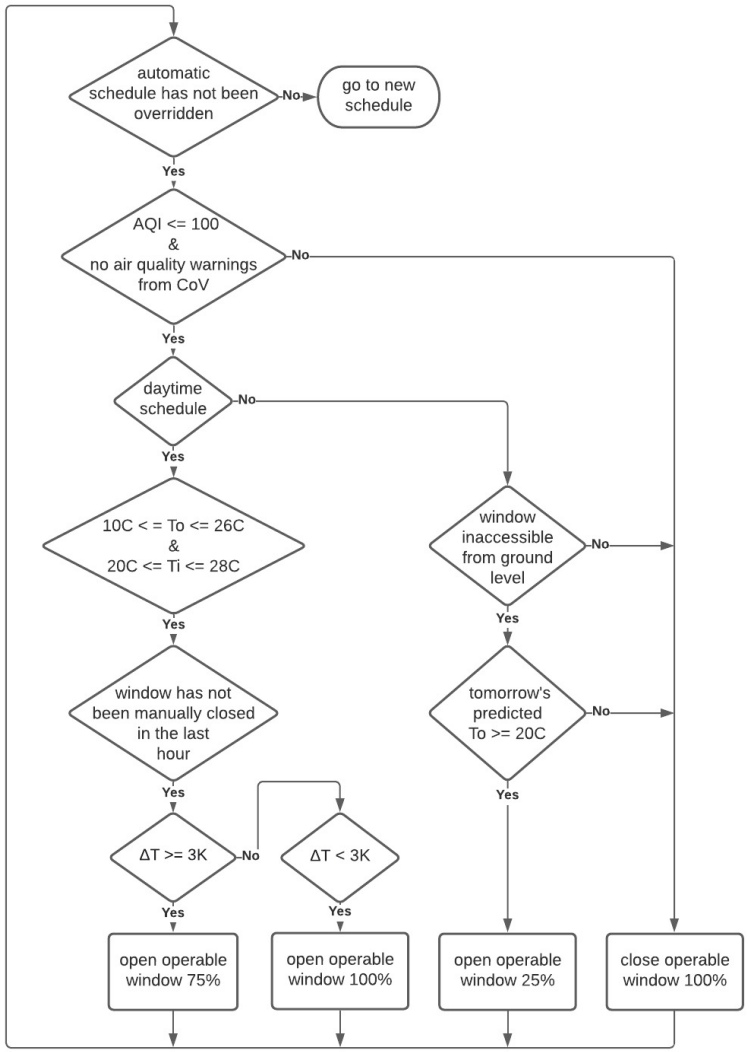
GRAY WATER TANKS				
LOCATION		LOFTS	MASTER BATH, ONE BED APARTMENT	THREE BED APARTMENT UPPER BATH, TWO BED APARTMENT, TOWNHOUSE ALL BATHS
MANUFACTURER		BARR PLASTICS	BARR PLASTICS	BARR PLASTICS
CAPACITY	L	22	45	90
SIZE (L x H x W)	mm x mm x mm	600 x 600 x 63	800 x 800 x 70	1000 x 1000 x 90
SHELL MATERIAL		HDPE	HDPE	HDPE

Automatic Controls for HVAC Zone





Automatic Window Controls



M6 Control Flow Charts

Natural Ventilation

The area A of each opening required to give a ventilation rate q for a specified value of h is:

$$A = \frac{q}{C_d}\sqrt{\frac{(T_I + 273)}{\Delta T\, g\, h}} \qquad (4.12)$$

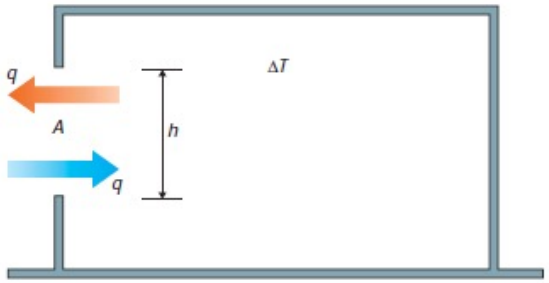


Figure 4.10 Case 2: single-sided ventilation, single opening, driven by buoyancy alone

Example 4.1: case 6: buoyancy alone (uniform internal temperature)

The aim is to achieve the flow pattern shown in Figure 4.14, i.e. fresh air enters all rooms and all of the stale air exits through the upper opening. This flow pattern means that the pressure difference must change sign at a height which lies somewhere between z_3 and z_4. The height at which $\Delta p_0 = 0$ is known as the 'neutral height', z_n. By specifying z_n, Δp_0 is specified by equation 4.11 (with wind terms omitted, i.e. wind speed set to zero) by putting $\Delta p_i = 0$ and $z_i = z_n$, i.e:

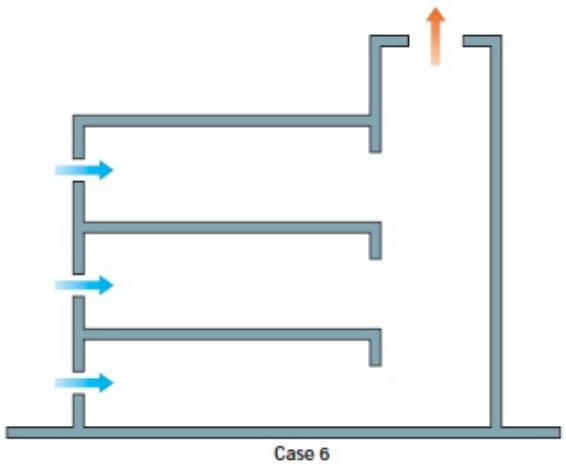
$$\Delta p_0 = \Delta\rho_0\, g\, z_n \qquad (4.15)$$

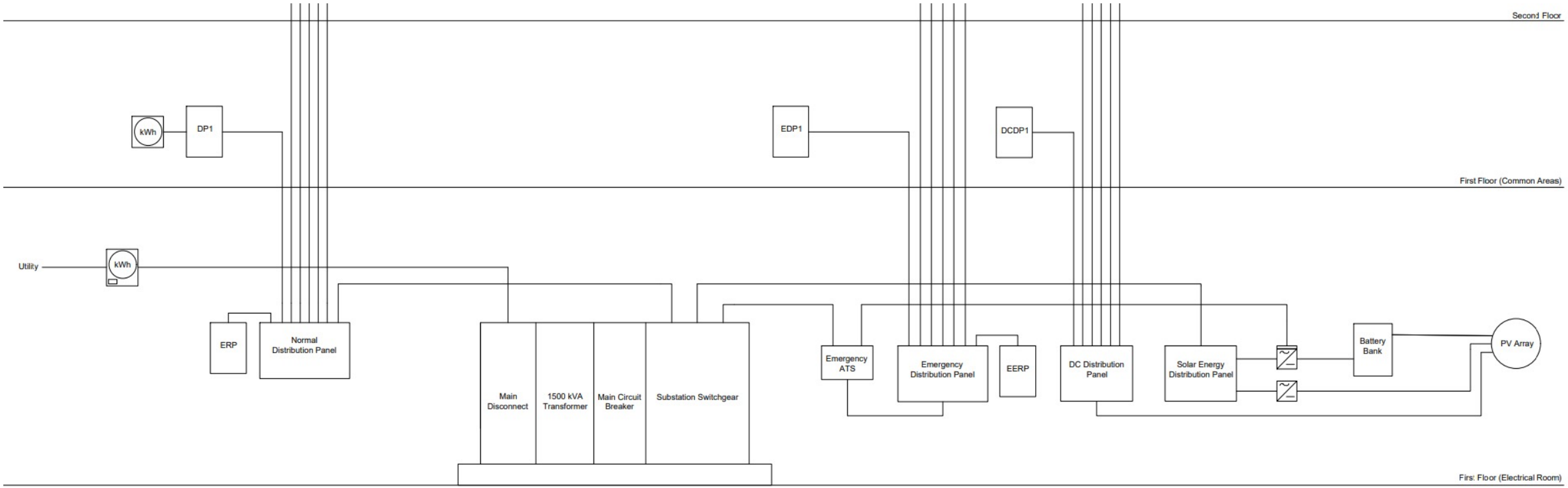
It then follows that Δp_i is known and is given by:

$$\Delta p_i = \Delta\rho_0\, g\, z_n - \Delta\rho_0\, g\, z_i \qquad (4.16)$$

The required areas can then be found using a rearrangement of equation 4.10, i.e:

$$C_{di}\, A_i = \frac{q_i}{S_i}\sqrt{\frac{\rho_0}{2|\Delta p_i|}} \qquad (4.17)$$





E1 Electrical Power Riser

selectronic

SP PRO Series 2*i*

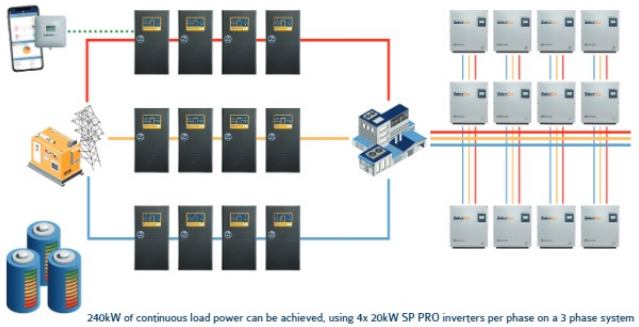
The SP PRO series of bi-directional inverter chargers is one of the most flexible and intelligent available in the market today. A modular approach can handle systems up to 240kW in 20kW blocks, whilst using sophisticated communications can manage up to 480kW of AC Coupled PV.

Battery Voltages of 24V, 48V and 120V are accommodated. Additionally, by incorporating unlimited DC Coupled solar, wind, back up generator or a grid supply, our ethos of never being without power is always met.

The same SP PRO is suitable for both Off-Grid and Solar Hybrid (grid-connect) installations for residential, commercial and industrial projects. Our inverters provide true transition from a hybrid to an off-grid system (and vice versa) with a simple on-site setting change.

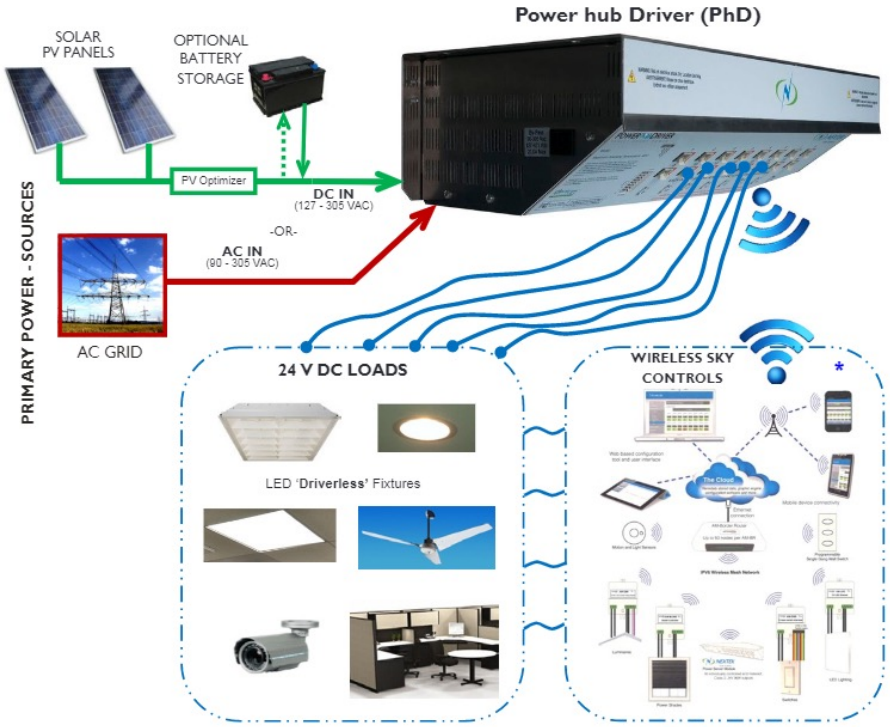
Selectronic inverters have been made in Australia since 1981 and since then have powered 1000s of sites from the tropics of Indonesia, the mountains of the Himalayas, the deserts of UAE, the outback of Australia and on suburban homes throughout the world. In fact, nobody has more experience in this market sector than Selectronic.

At Selectronic we strive for lowest total ownership costs. New firmware releases are

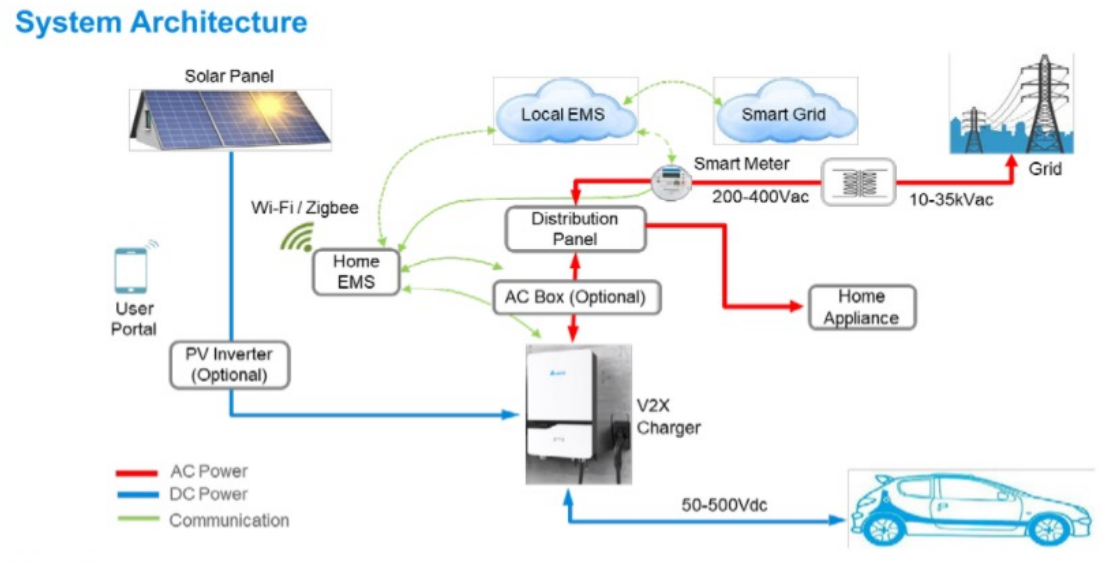


240kW of continuous load power can be achieved, using 4x 20kW SP PRO inverters per phase on a 3 phase system

NEXTEK Power Systems



Power Distribution



V2H/V2G Charger

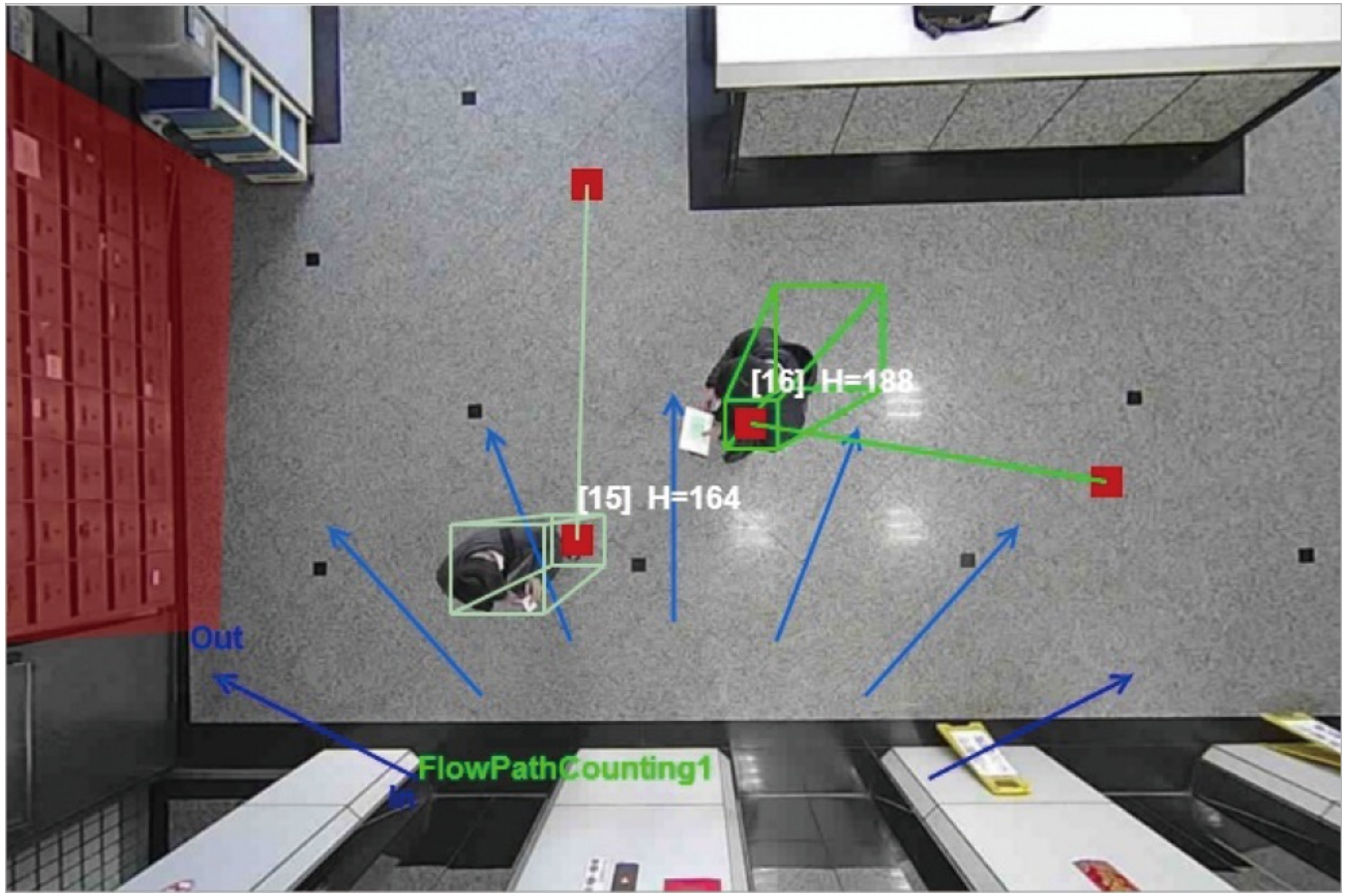
B.C. tops North America for electric vehicle uptake in 2020, says minister

Tesla's Model 3 standard range tops electric cars in B.C. for rebate claimed by owners

Townhouse: 18.5 kW of installed load

Carrigg, D. (2021, April 07). B.C. tops North America for electric VEHICLE uptake in 2020, Says minister. Retrieved April 13, 2021, from https://vancouversun.com/news/local-news/b-c-tops-north-america-for-electric-vehicle-sales-in-2020-says-minister

V2G

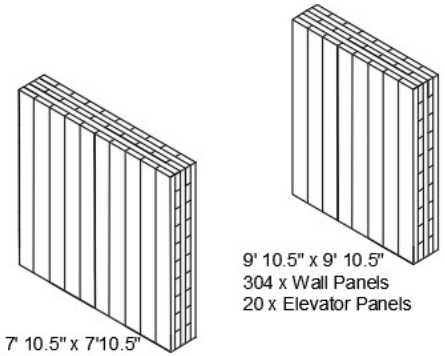


Vivotek SC8131

Smart Systems

Kit of Parts

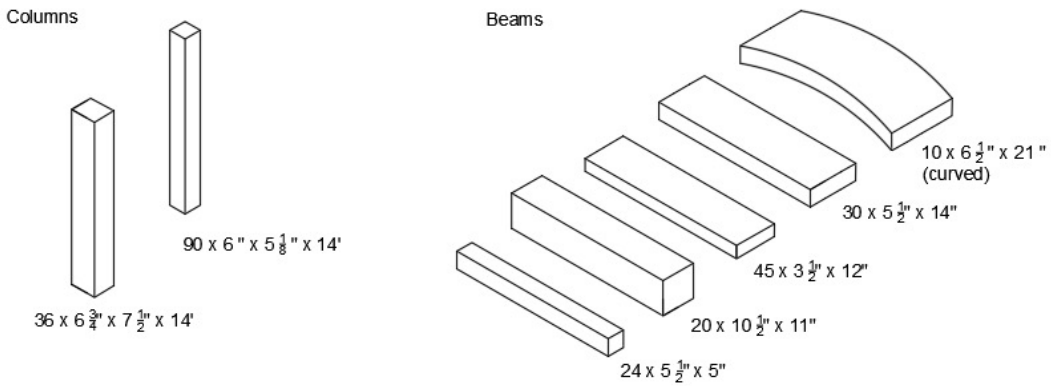
175 V (6.9") CLT Panels



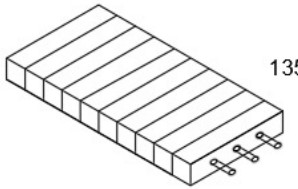
7' 10.5" x 7'10.5"
576 x Wall Panels
10 x Elevator Panels

9' 10.5" x 9' 10.5"
304 x Wall Panels
20 x Elevator Panels

Glulam Columns and Beams

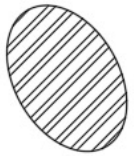


7 3/4 " DLT Floor Panels

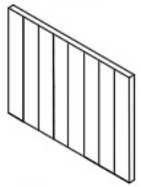


135 x 36" x 60.5'

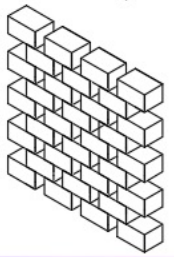
Exterior



24 Gauge Steel Panels
6 x Pre-Cut Mini-Gazebo Panels

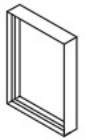


Western Red Cedar Re-Sawn
Channel Wood Siding
6110 x 1' x 6'

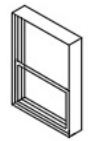


Panelized Brick Screen
640 x 4' x 4'

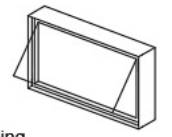
Windows



Fixed
140 x 16" x 63"



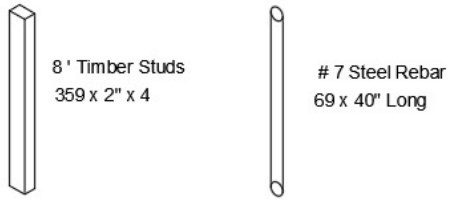
Single Hung
172 x 60" x 71"



Awning
32 x 40" x 134"

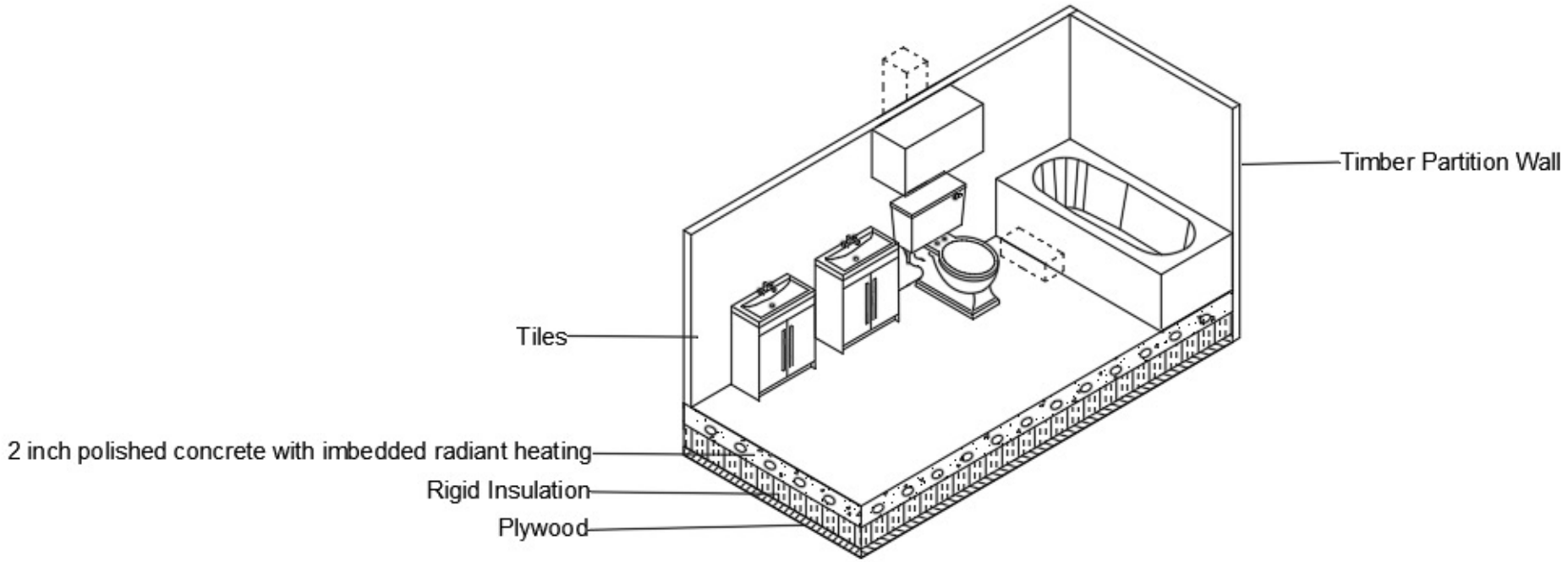
Skylight
11 x 4.6' x 14.2'

Brick Retrofit

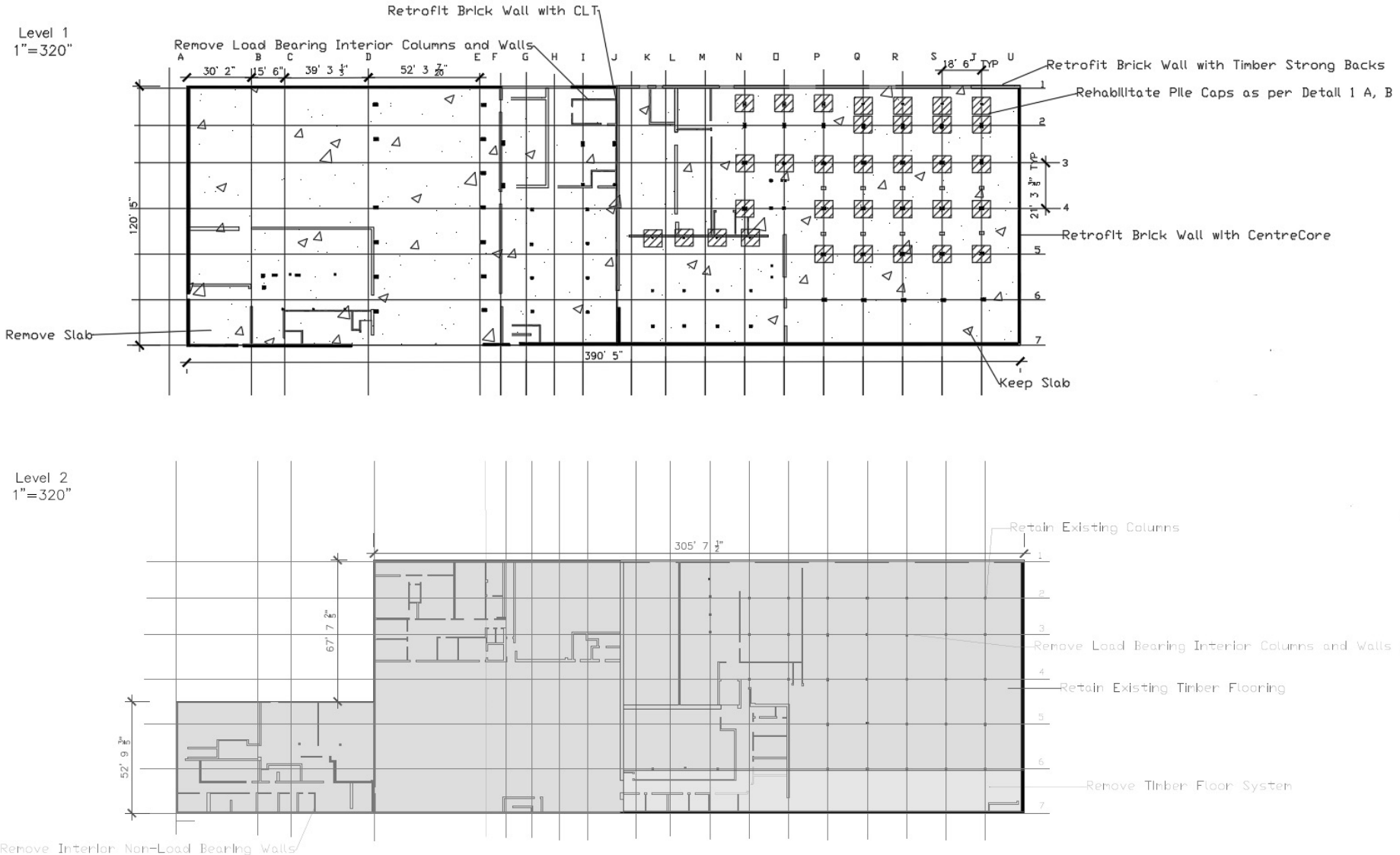


8 ' Timber Studs
359 x 2" x 4

7 Steel Rebar
69 x 40" Long

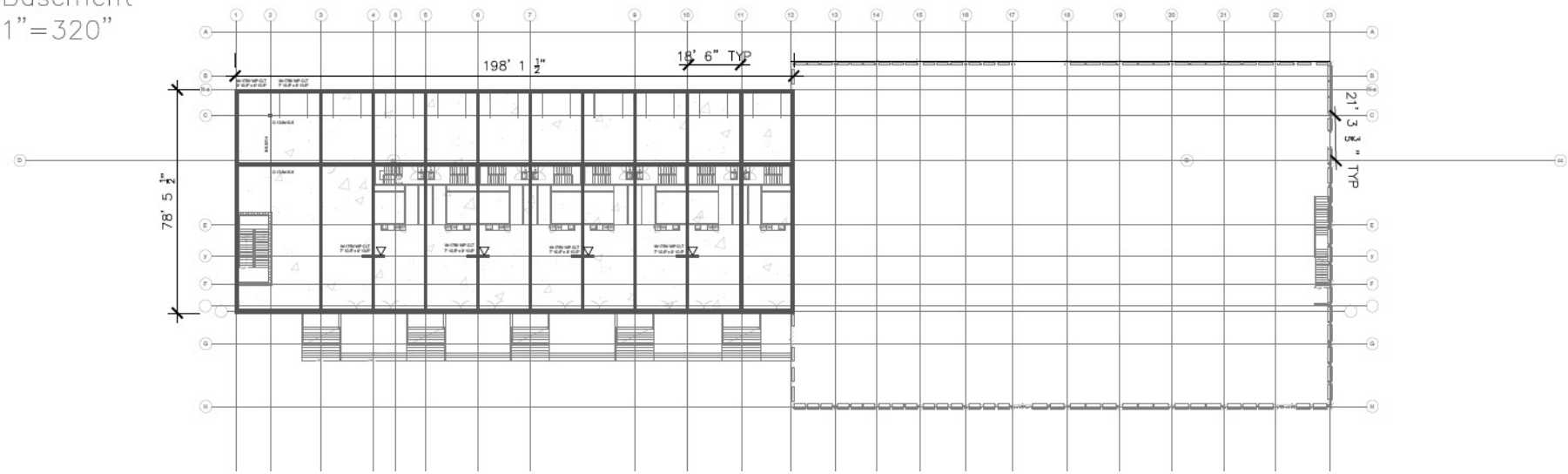


Pre-made Bathrooms

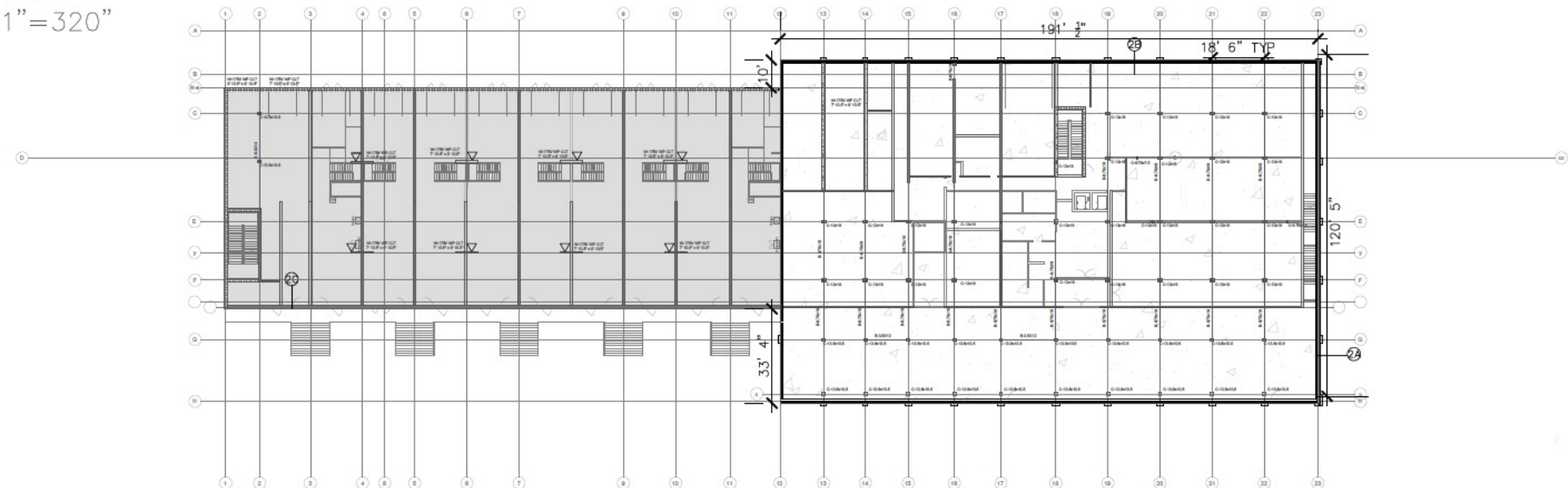

Level 1
1"=320"
Retrofit Brick Wall with CLT
Remove Load Bearing Interior Columns and Walls
Retrofit Brick Wall with Timber Strong Backs
Rehabilitate Pile Caps as per Detail 1 A, B
Retrofit Brick Wall with CentreCore
Remove Slab
Keep Slab
390' 5"
120' 5"
Level 2
1"=320"
Retain Existing Columns
305' 7 1/2"
67' 7 7/8"
52' 9 3/8"
Remove Load Bearing Interior Columns and Walls
Retain Existing Timber Flooring
Remove Timber Floor System
Remove Interior Non-Load Bearing Walls

Demo Plan

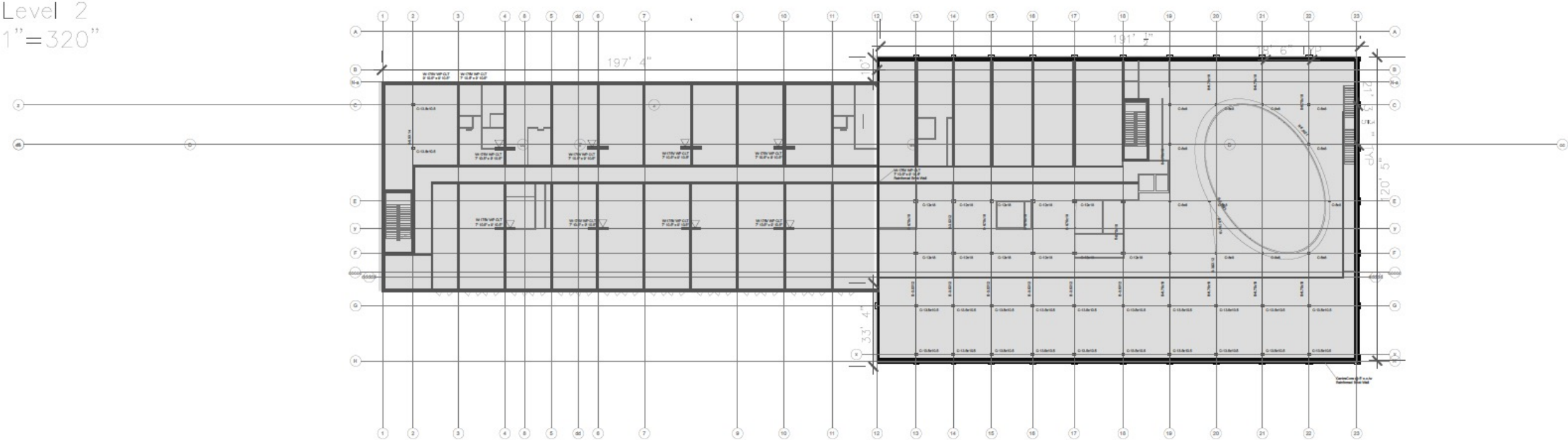
Basement
1"=320"



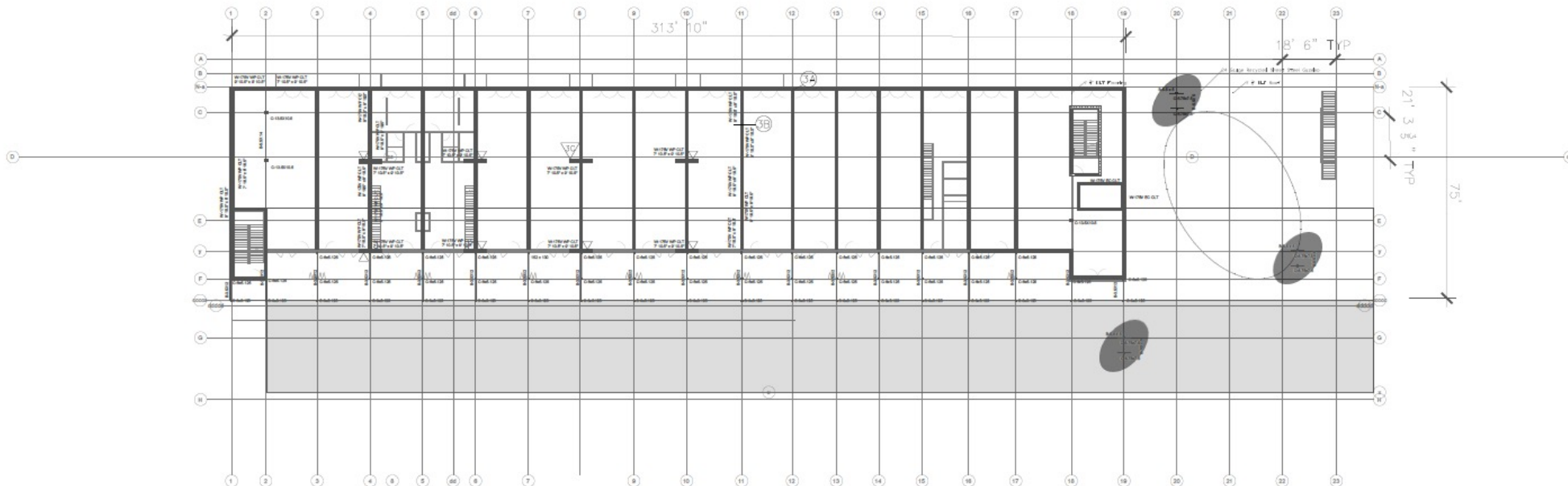
Level 1
1"=320"



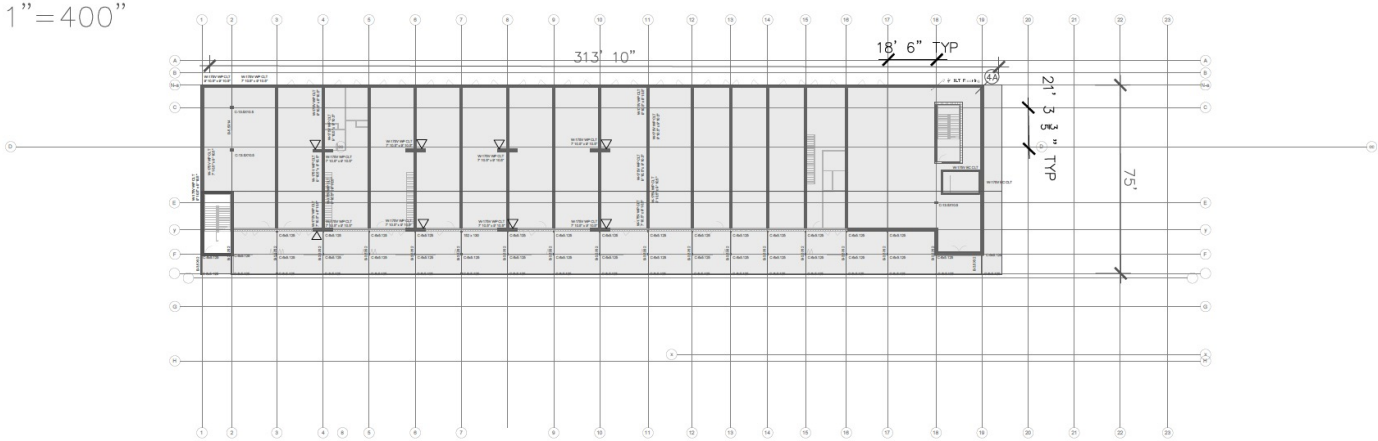
Level 2
1"=320"



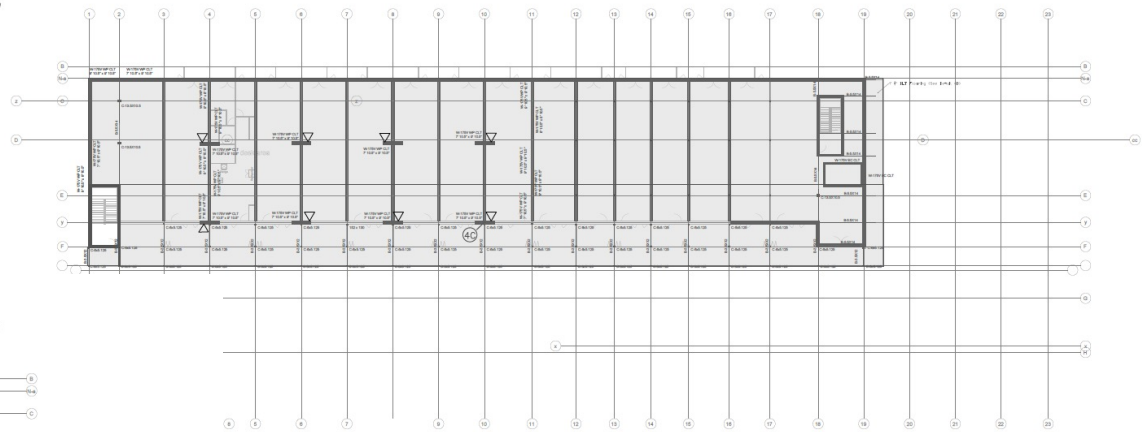
Level 3
1"=320"



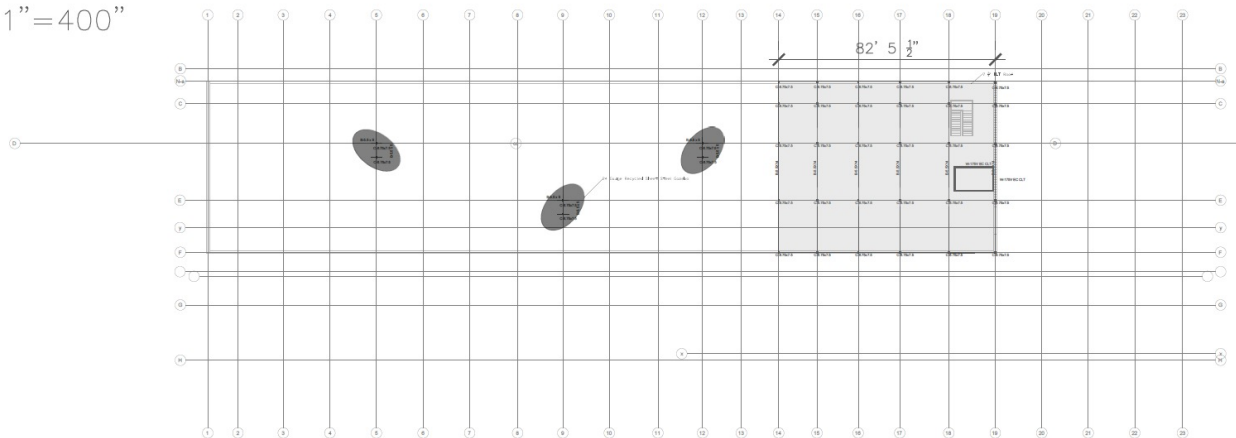
Level 4
1”=400”

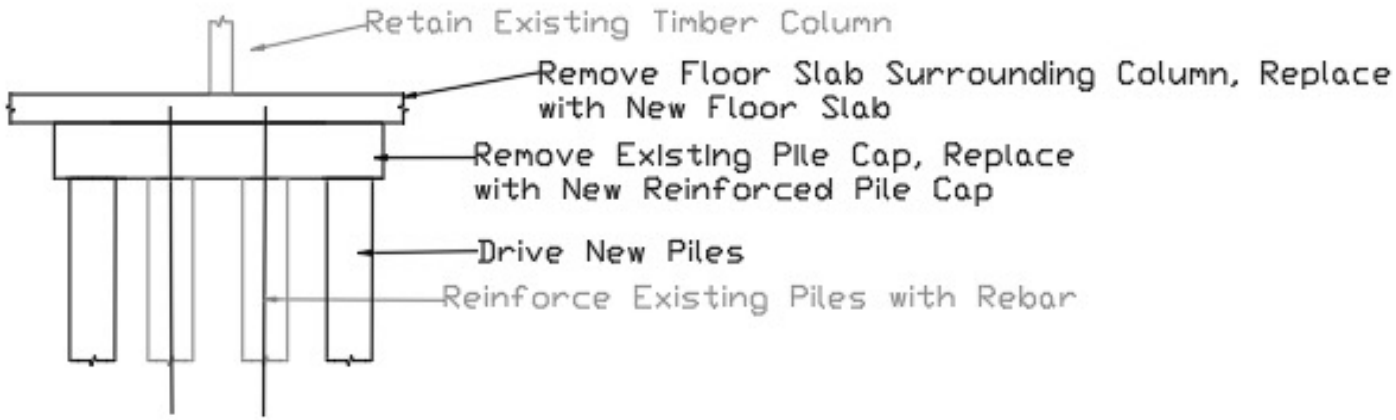


Level 5
1”=400”

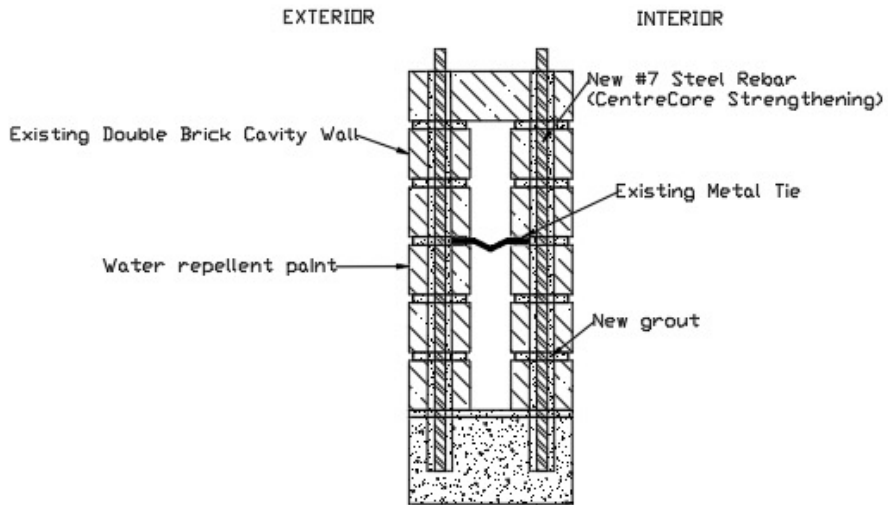


Roof
1”=400”

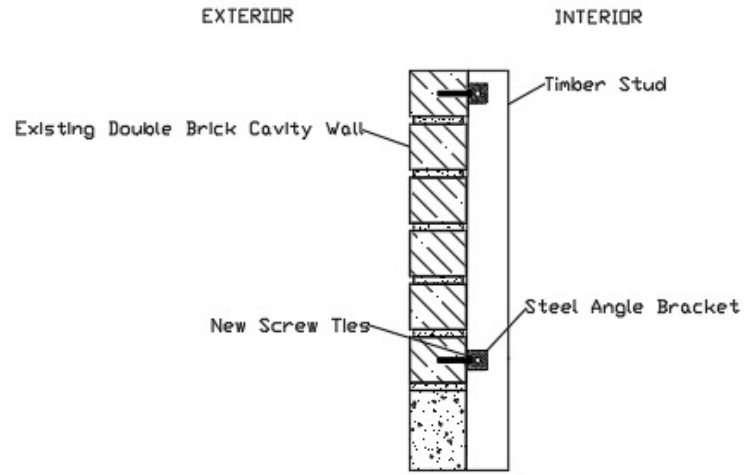




Detail 1 A
1"=157"
Retrofitting Foundation Piles

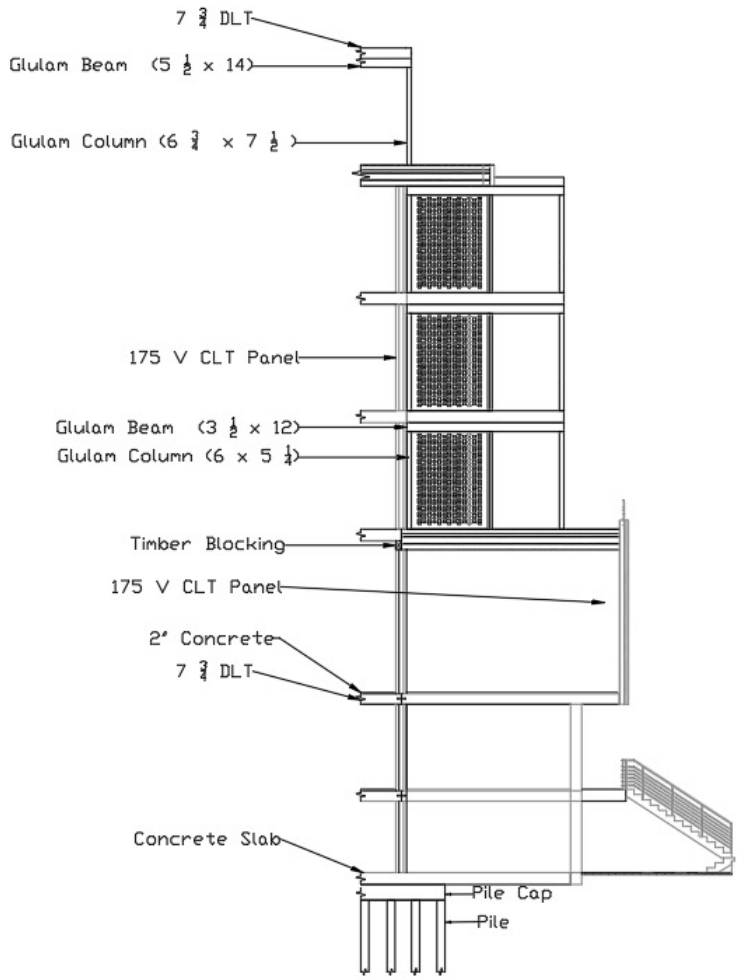


Detail 2A
1"=18"
South and East Side CentreCore
@5' o.c/W



Detail 2B
1"=18"
North Side Timber Strong Backs
@16" o.c/W

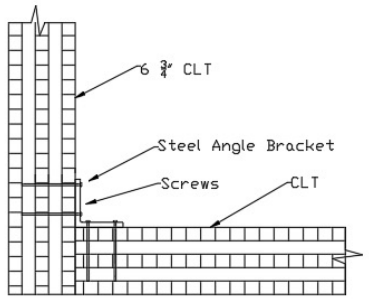
Retrofitting



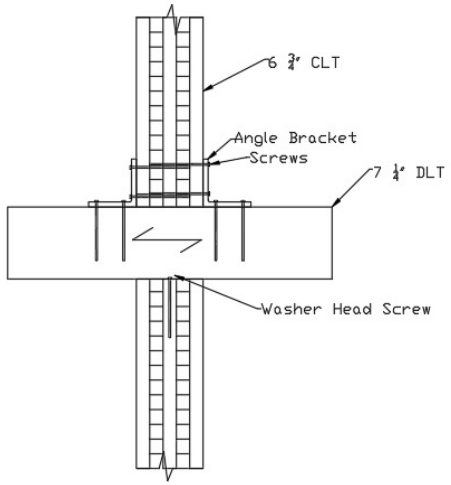
Detail 2C
1"=242"
Full New Construction
Assembly

Full Assembly

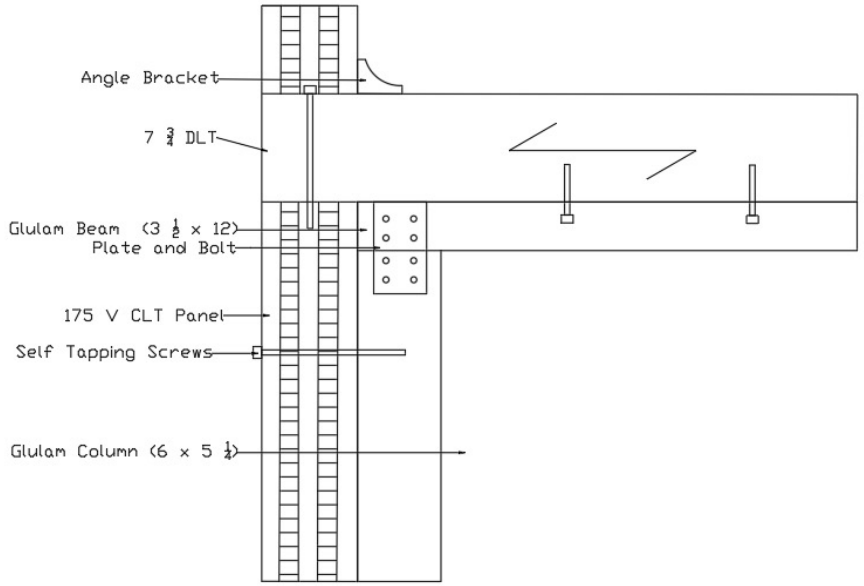
Detail 4A
1"=27.5"
Typical Corner
CLT-CLT
Connection

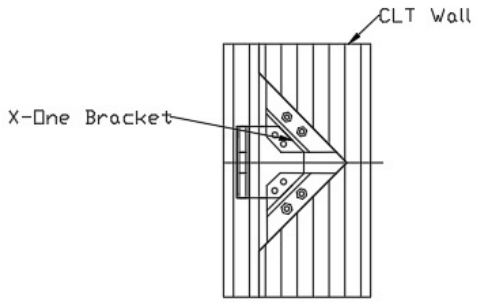


Detail 4B
1"=27.5"
Typical CLT-DLT
Connection

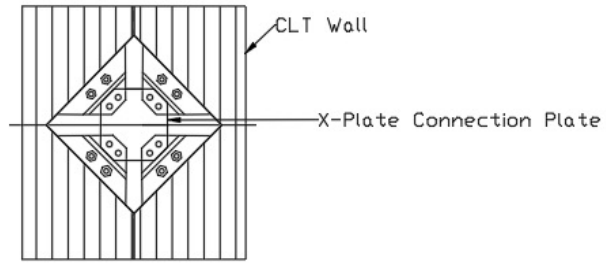


Detail 4C
1"=27.5"
Typical Balcony Connection





Detail 3A: Typical X-RAD Connection System for Perpendicular Wall Sections



Detail 3B: Typical X-RAD Connection System for Parallel Wall Sections

Connections